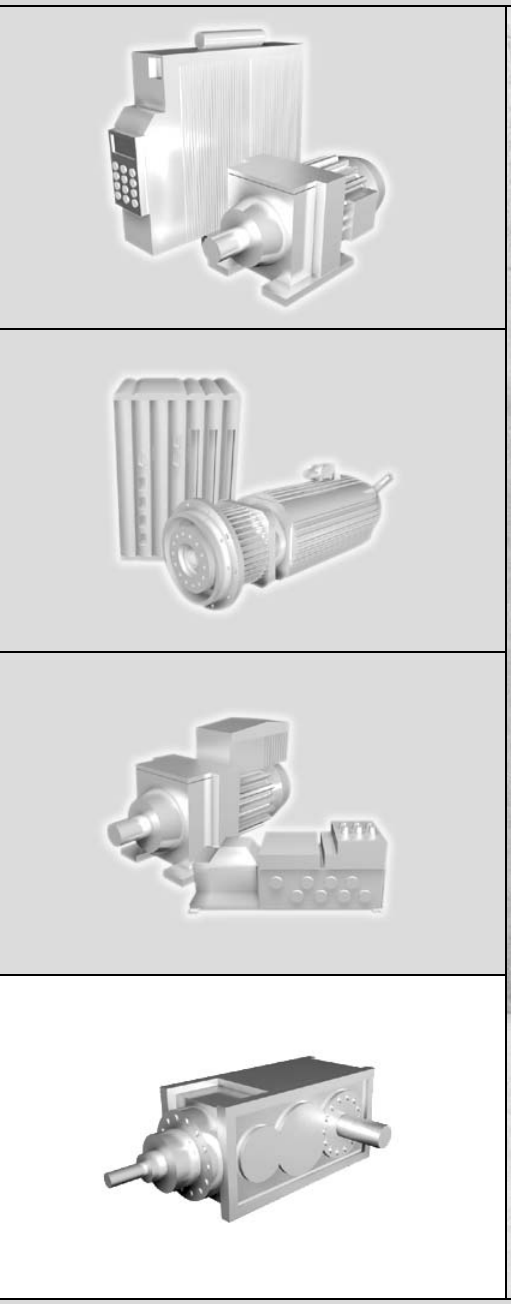
SEW EURODRIVE

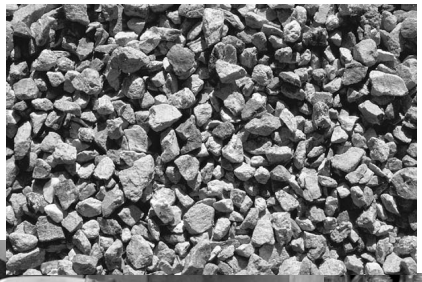


Explosion-Proof
MC... Series Industrial Gear Units

GD210000

Edition 06/2006
11460628 / EN

Operating Instructions



SEW EURODRIVE

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1 Important Notes on the Operating Instructions

1.1 Important notes and designated use

Integral part of the product

The operating instructions are an integral part of the explosion-proof MC.. series industrial gear units and contain important notes on operation and service. The operating instructions are written for all personnel carrying out assembly, installation, startup and maintenance of the MC.. series industrial gear units.

Designated use

The MC.. series industrial gear units are intended for commercial and industrial systems and may only be used in compliance with the information provided in SEW-EURODRIVE technical documentation and the information given on the nameplate. They correspond to valid standards and regulations and meet the requirements of EC Directive 94/9/EC and the EC Directive for Machinery 98/37/EG.

Gear unit loads other than those specified, and applications other than industrial and commercial systems can only be used after consultation with SEW-EURODRIVE.

Each application above and beyond these is considered non-designated use.

Qualified personnel

Explosion-proof MC.. series industrial gear units are a potential source of hazards for personnel and equipment. Consequently, only trained personnel who are aware of the potential hazards may perform assembly, installation, startup, and service work.

Personnel must be appropriately qualified for the task in hand and must be familiar with the

- assembly
- installation
- startup
- operation

of the product.

Personnel must carefully read the operating instructions, in particular the safety notes section, and make sure that they understand and comply with them.

Liability for defects

Incorrect handling or any action performed that is not specified in these operating instructions could adversely affect the properties of the product. When this is the case, you lose any right to claim against SEW-EURODRIVE GmbH & Co KG under limited warranty.

Product names and trademarks

The brands and product names contained within these operating instructions are trademarks or registered trademarks of the titleholders.

Disposal

(Please observe current regulations):

- Housing parts, gears, shafts, and roller bearings of the gear units must be disposed of as steel scrap. This also applies to gray-cast iron parts if there is no separate collection for them.
- Collect waste oil and dispose of it in the proper manner.

1.2 Explanation of symbols

Electrical hazard
Possible consequences: Severe or fatal injuries

Hazard
Possible consequences: Severe or fatal injuries

Hazardous situation
Possible consequences: Slight or minor injuries

Harmful situation
Possible consequences: Damage to the drive and the environment

Tips and useful information

Important information on explosion protection

1.3 Notes on operation

- **MC.. series industrial gear units are delivered without oil fill. Refer to the information on the nameplate.**
- **The mounting position may only be changed after prior consultation with SEW-EURODRIVE. ATEX certification and the guarantee will become void without prior consultation.**
- **Please follow the instructions in the "Mechanical Installation / Installing the Gear Unit" section.**

2 Safety Notes

2.1 Introduction

- **The following safety notes are concerned with the use of MC.. series industrial gear units.**
- **Also note the supplementary safety notes in the individual sections of these operating instructions.**

2.2 General information

Risk of burns

Touching the gear unit before it has cooled down will result in burns.

Never touch the gear unit during operation or in the cool down phase once the unit has been switched off. The cool down phase is at least 8 hours long.

Never install damaged products or put them into operation.

Please submit a complaint to the shipping company immediately in the event of damage.

During or after operation, industrial gear units and motors have:

- Live parts
- Moving parts
- Hot surfaces (may be the case)

Only qualified personnel may carry out the following work:

- Installation / Assembly
- Connection
- Startup
- Maintenance
- Servicing

The following information and documents must be observed during this work:

- Relevant operating instructions and wiring diagrams
- Warning and safety signs on the gear unit
- System-specific regulations and requirements
- National / regional regulations governing safety and the prevention of accidents

Serious injuries and property damage may result from:

- Improper use
- Incorrect installation or operation
- Unauthorized removal of necessary protective covers or the housing

General

- Work carefully and keep safety in mind.
- If you observe changes in the gear unit during operation, an increase in the operating temperature or a difference in the sound of the gear unit, put the drive unit out of operation immediately.
- When installing the gear unit in devices or systems, the manufacturer of the device or system is obligated to include the regulations, notes, and descriptions in these operating instructions in his own operating instructions.
- Observe the notes attached to the gear unit, e.g. nameplate and direction arrow. They must be free of paint or dirt. Replace missing signs.
- Work on the gear unit only when the machine is not in use. Prevent the drive unit from being accidentally switched on by locking the keyswitch or removing the fuses from the power supply. Put a sign at the on-switch to warn that the gear unit is being worked on.

Transportation

Inspect the shipment for any damage that may have occurred in transit as soon as you receive the delivery. Inform the shipping company immediately. It may be necessary to preclude startup.

Startup / operation

Check that the direction of rotation is correct in the decoupled state. Listen for unusual grinding noises when you are turning the shaft.

Secure the shaft keys for the test mode without drive elements. Do not deactivate monitoring and protection equipment inoperative even for the test mode.

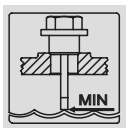
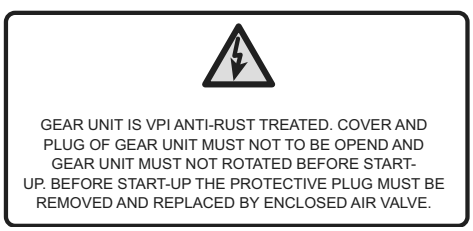
When in doubt, switch off the main motor whenever changes occur during normal operation (e.g. increased temperature, noise, vibration). Determine the cause and contact SEW-EURODRIVE, if required.

Inspection / maintenance

Follow the instructions in the "Inspection and Maintenance" section.

2.3 Symbols on the gear unit

The symbols on the gear unit must be noted. They have the following meaning:

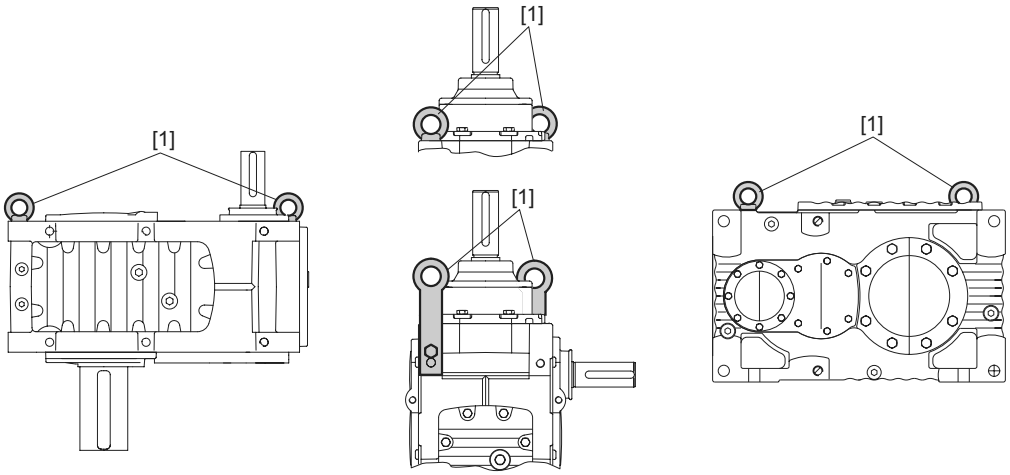
Symbol	Meaning
	Breather valve
	Oil filling screw
	Oil draining screw
	Lubrication points
	Oil sight glass
	**Dipstick**
	Direction of rotation
	Delivery status
	Hot surfaces
	**Long-term storage**

2.4 Transporting industrial gear units

Transport eyebolts

Tighten screwed in transport eyebolts [1] firmly. They are only designed for the weight of the industrial gear unit including the motor connected via motor adapter; do not attach any additional loads.

Vertical mounting position (V)	**Upright mounting position (E)**	**Horizontal mounting position (L)**



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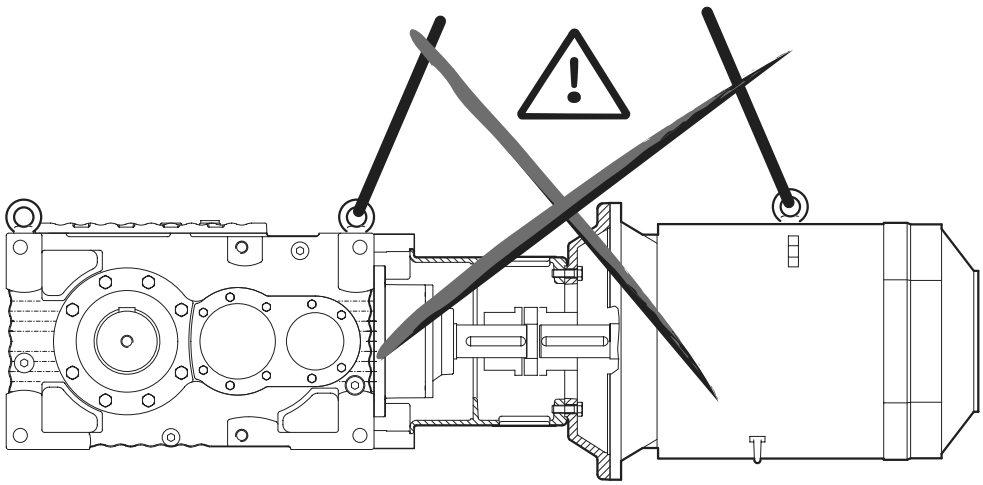
STOP

- **The main gear unit may only be lifted using lifting ropes or chains on the two eyebolts attached to the main gear unit. The weight of the gear unit is indicated on the nameplate or the dimension sheet. The loads and regulations specified in that document must always be observed.**
- **The length of the lifting chains or ropes must be dimensioned so that the angle between the chains or ropes does not exceed 45 degrees.**
- **Transport eyebolts attached to the motor, auxiliary gear unit, or primary gear unit may not be used for transport (→ following figures).**



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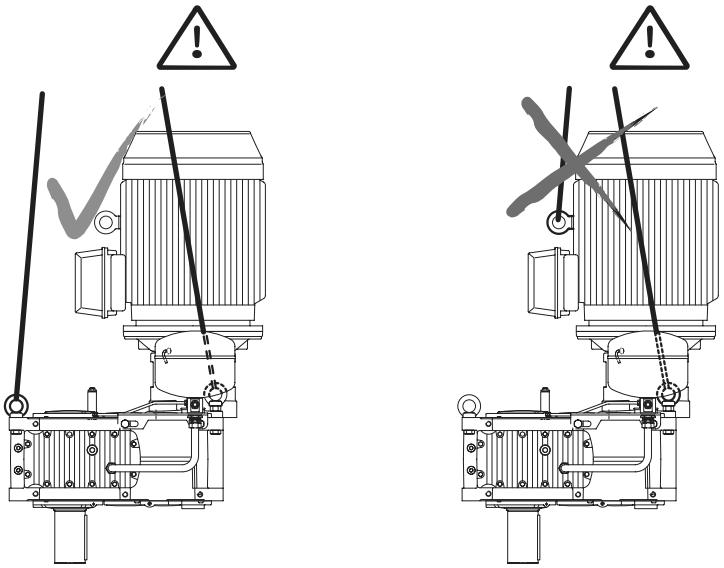

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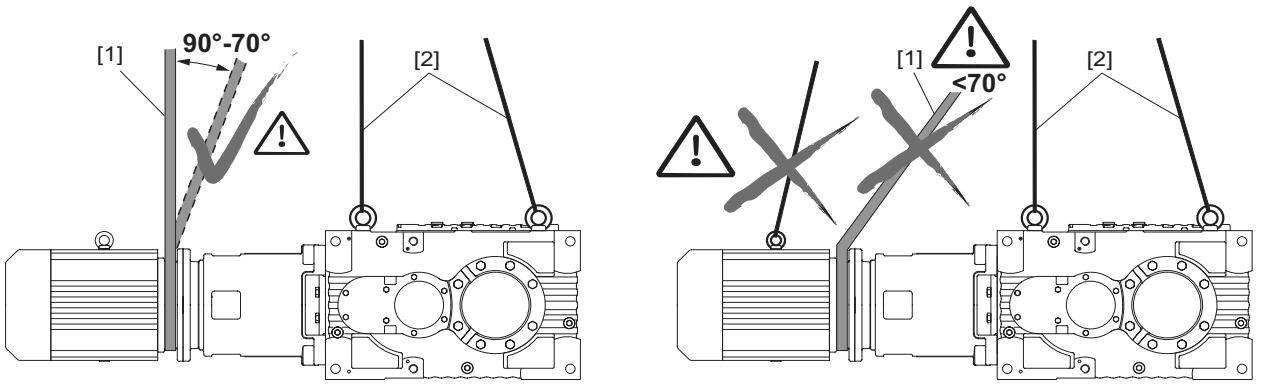
- **Use suitable, sufficiently rated means of transportation if necessary. Remove securing devices used for transportation prior to startup.**

Transporting MC.. industrial gear units with motor adapter

Industrial gear units of the **MC.P.. /MC.R.. series with motor adapter** (→ following figure) may **only** be transported using **lifting ropes/chains [2] or lifting belts [1]** at an **angle of 90 (vertical) to 70** degrees.



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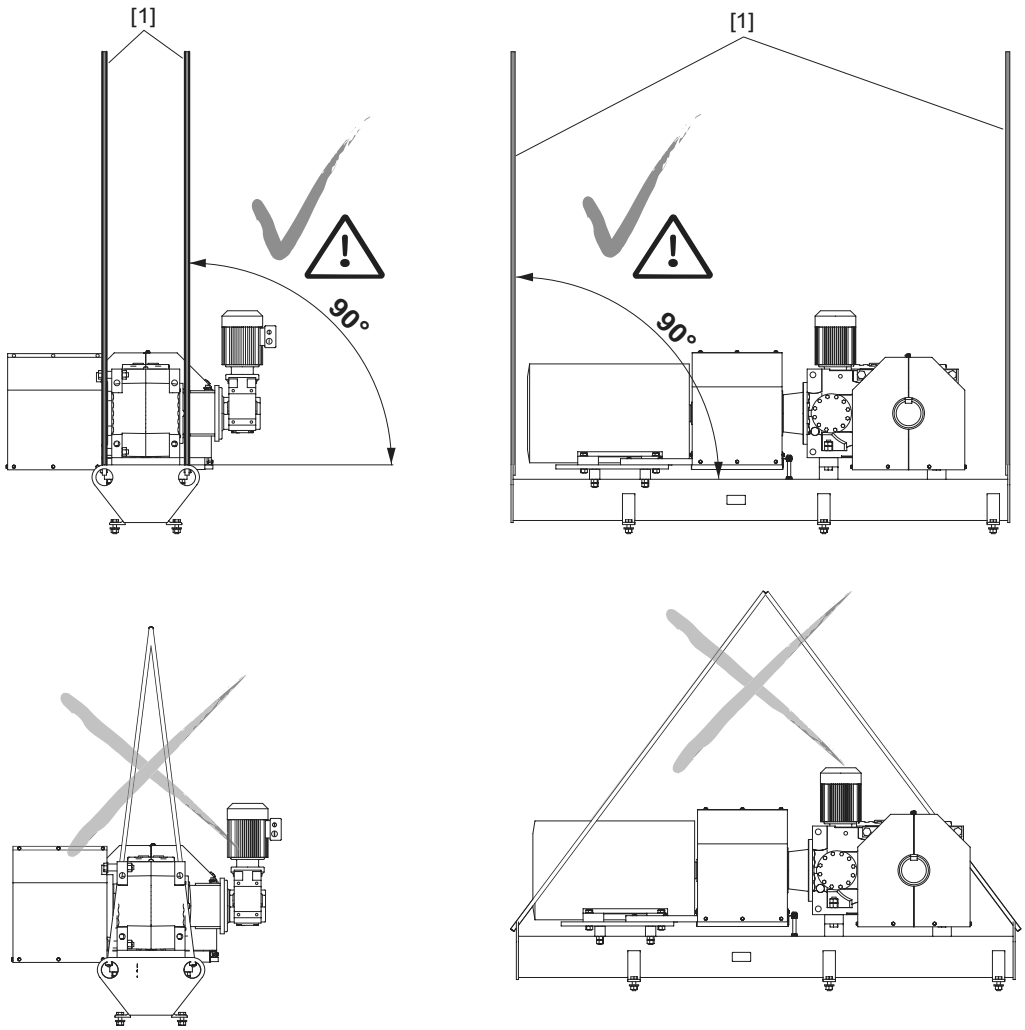
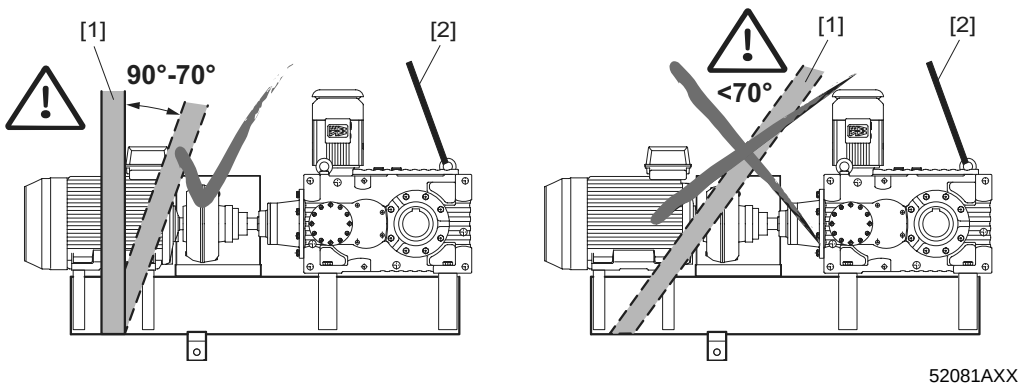
Transporting MC.. industrial gear units on a base plate

Industrial gear units of the **MC.. series on a base plate** (→ following figure) may **only** be transported with the **lifting ropes** [1] or chains (90 degree angle) **vertically** secured to the base frame:



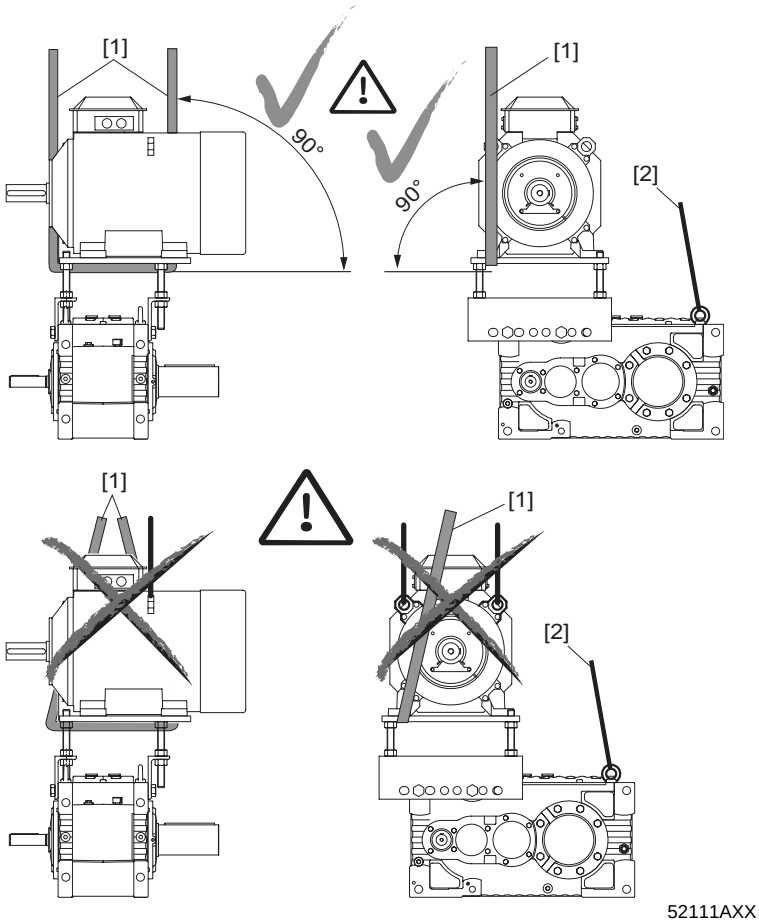
Transporting MC.. industrial gear units on a swing base

Industrial gear units of the **MC..** series **on a swing base** (→ following figure) may **only** be transported using **lifting ropes [1] or lifting chains [2]** at an **angle of 90 (vertical) to 70 degrees**.



Transporting MC.. industrial gear units with V-belt drive

Industrial gear units of the **MC.. series with V-belt drive** may **only** be transported using **lifting belts [1] and lifting ropes [2]** at an **angle of 90 degrees (vertically)**. The eye-bolts on the motor may **not** be used for transport.



2.5 Corrosion and surface protection

The information in this section applies only for MC.. series industrial gear units that have been installed in Europe. It is possible that other regions use a different painting system. Contact your local SEW-EURODRIVE assembly plant for MC.. industrial drives.

Introduction

The corrosion and surface protection of gear units comprises the following three basic features:

1. Painting system
   - Standard painting system K7 E160/2
   - High-resistance painting system E260/3 optional
2. Gear unit corrosion protection with
   - interior protection and
   - exterior protection
3. Gear unit packaging
   - Standard packaging (pallet)
   - Wooden crate
   - Seaworthy packaging

Standard painting system K7 E160/2

Painting according to TEKNOS EPOXY SYSTEM K7 based on TEKNOPLAST HS 150 high-solid epoxy paint.

Two-layer system K7 E 160/2	Thickness
• Epoxy primer	60 µm
• Teknoplast HS 150	100 µm
TOTAL	**160 µm**

Color: RAL 7031, blue gray

Protective covers

Powder coating, epoxy-based coat paint (EP) is used for protective covers.

Coat thickness: 65 µm

Color: TM 1310 PK, warning in yellow

High-resistance painting system K7 E 260/3

Painting according to TEKNOS EPOXY SYSTEM K7 based on TEKNOPLAST HS 150 high-solid epoxy paint.

E 260/3 Three-layer system	Thickness
• Epoxy primer	60 µm
• Teknoplast HS 150	2x100 µm
Total thickness	**260 µm**

Optional color

Other colors are available on request.

Using the painting system

Environmental pollution	None	Low	Medium	High	Very high
Typical environmental conditions		Unheated buildings where condensation can build up. Atmospheres with low pollution. Mostly rural areas.	Production halls with high humidity levels and low air contamination. City and industrial atmospheres, moderate contamination with sulphur dioxide. Coastal areas with a low salt load.	Industrial areas and coastal areas with a moderate salt load. Chemical plants	Buildings or areas with almost permanent condensation and high levels of contamination. Industrial areas with high humidity and aggressive atmospheres
Assembly	Indoors	Indoors	Indoors or outdoors	Indoors or outdoors	Indoors or outdoors
Relative humidity	< 90 %	Up to 95 %	Up to 100 %	Up to 100 %	Up to 100 %
Recommended painting system	Standard painting system K7 E160/2	Standard painting system K7 E160/2	Standard painting system K7 E160/2	High-resistance painting system K7 E260/3	Contact SEW-EURODRIVE

Storage and transport conditions

MC series industrial gear units are delivered without oil fill. Different protection systems are required depending on the storage period and environmental conditions:

Storage period: Up to ... months	Storage Conditions Gear Unit Corrosion Protection				Transport conditions Gear unit packaging	
	OUTDOORS, roofed	INDOORS, heated (0 to +20°C)	OUTDOORS at the sea, roofed	INDOORS at the sea	Land transport	Sea transport
6	Standard protection	Standard protection	Contact SEW-EURODRIVE	Long-term protection	Standard packaging	Seaworthy packaging
12	Contact SEW-EURODRIVE	Standard protection	Contact SEW-EURODRIVE	Long-term protection	Standard packaging	Seaworthy packaging
24	Long-term protection	Contact SEW-EURODRIVE	Contact SEW-EURODRIVE	Long-term protection	Standard packaging	Seaworthy packaging
36	Contact SEW-EURODRIVE	Long-term protection	Contact SEW-EURODRIVE	Long-term protection	Standard packaging	Seaworthy packaging

Standard protection / indoors

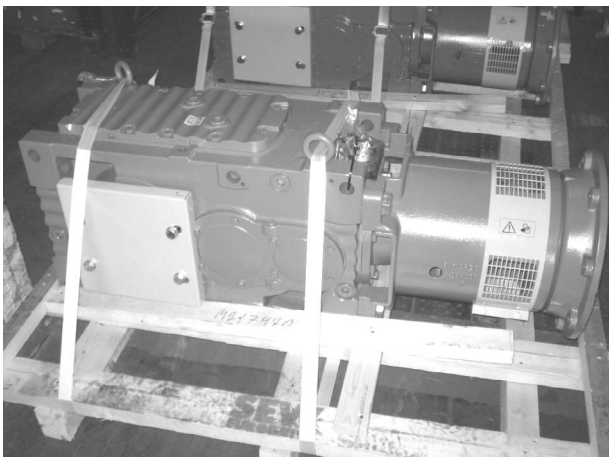
- Gear units undergo a test run with protective oil. The protective oil is drained by SEW-EURODRIVE before dispatch. The remaining layer of protective oil on the inner parts serves as basic protection.

Standard protection / outdoors

- Oil seals and seal surfaces are protected using suitable bearing grease.
- Unpainted surfaces (including spare parts) are covered with a protective coating. Before other equipment is mounted to these surfaces, the protective coating must be removed using a solvent.
- Small spare parts and loose pieces, such as screws, nuts, etc., are supplied in corrosion protection plastic bags (VCI corrosion protection bag).
- Threaded holes and blind holes are covered by plastic plugs.
- Breather plug (position → "Mounting Positions" section) installed at the factory.

Standard protection / packaging

Standard packaging is used: the gear unit is delivered on a pallet without cover.



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- **If the gear unit is stored longer than 6 months, we recommend that you regularly check the protective coating of unpainted areas as well as the paint coating. Areas with protective coating or paint that has been removed may have to be repainted.**
- **The output shaft must be rotated at least one turn so that the position of the roller elements in the bearings of the input and output shafts changes. This procedure has to be repeated every 6 months until startup.**

Long-term protection / indoors

Protection of the inside of the gear unit in addition to "standard protection:"

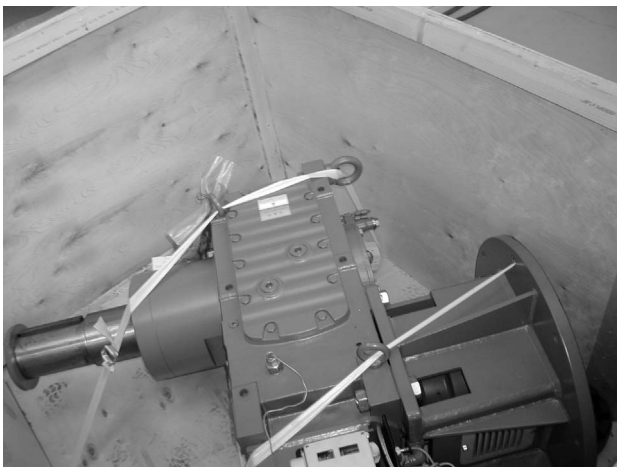
- A VPI solvent is sprayed through the oil filling hole.
- The breather plug is replaced with a screw plug (before startup, the screw plug must be replaced again by the breather plug). The breather plug is attached to the gear unit separately.
- **Never open the gear unit near open flames, sparks, or hot objects because the solvent vapors might ignite.**
- **Take preventive measures to protect personnel from the solvent vapors. Exclude the possibility of open flames when the solvent is being applied and when it evaporates.**

Long-term protection / outdoors

- Oil seals and sealing surfaces are protected by suitable grease.
- Unpainted surfaces (including spare parts) are covered with a protective coating. Before other equipment is mounted to these surfaces, the protective coating must be removed using a solvent.
- Small spare parts and loose pieces, such as screws, nuts, etc., are supplied in corrosion protection plastic bags (VCI corrosion protection bag).
- Threaded holes and blind holes are covered by plastic plugs.
- The breather plug (position → "Mounting Positions" section) is already installed at the factory.

Long-term protection / packaging

- Seaworthy packaging is used: the gear unit is packed in a seaworthy wooden crate and delivered on a pallet.



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- **If the gear unit is stored longer than 6 months, we recommend that you regularly check the protective coating of unpainted areas as well as the paint coating. Areas with protective coating or paint that has been removed may have to be repainted.**
- **The output shaft must be rotated at least one turn so that the position of the roller elements in the bearings of the input and output shafts changes. This procedure has to be repeated every 6 months until startup.**
- **Long-term protection of the gear unit interior with the VPI solvent has to be repeated every 24 to 36 months until startup (according to the Storage and Transport Conditions table).**

Alternative packaging

The gear unit can be optionally supplied in a wooden crate with standard gear unit protection.

2.6 Safety notes for use in potentially explosive areas

Explosive gas mixtures or dust concentrations in combination with hot, live, moving parts of electrical machinery can cause serious injury or death.

Installation, connection, startup, maintenance and repair work on gear units/gearmotors and the optional electrical components may only be performed by qualified personnel while taking the following into account:

- These operating instructions
- The warning and safety signs on the gear unit/gearmotor
- All other project planning documents, operating instructions, and wiring diagrams included with the drive
- The regulations and requirements specific to the system
- Currently valid national/regional regulations (explosion protection, safety, prevention of accidents)

Designated use

The gear units/gearmotors are intended for industrial systems and may only be used in accordance with the information provided in the technical documentation of SEW-EURODRIVE and the information given on the nameplate. They meet the requirements set forth in Directive 94/9/EEC and comply with the applicable standards and regulations.

A drive motor connected to the gear unit may only be operated under the conditions described in the "Starting up gear units in potentially explosive areas" section.

A motor mounted to a gear unit by means of an adapter may only be operated on a frequency inverter when the data on the gear unit nameplate is complied with.

A motor connected to a gear unit by means of an adapter or belt may only be operated when the data on the gear unit nameplate is complied with.

Make sure that there are no corrosive chemicals that could damage the coating and seals in the immediate area.

2.7 Checklists

Before startup This checklist contains an overview of all of the points that must be checked **before startup** of a gear unit in a potentially explosive area in accordance with Directive 94/9/EC.

Check the following points before starting up a gear unit in a potentially explosive area	Check	Information in section ...
Inspect the shipment for any damage that may have occurred in transit as soon as you receive the delivery. Inform the shipping company immediately. It may be necessary to preclude startup. Remove any transport fixtures prior to startup.		2
Compare the data on the nameplate of the drive with the specifications for operation in a potentially explosive area on location: • Equipment group • Explosion protection category • Explosion protection zone • Temperature class • Maximum surface temperature		3.3 and 4.10
Have arrangements been made to prevent explosive atmospheres, oils, acids, gases, vapors or radiation during installation of the gear unit?		4.2
Does the ambient temperature comply with the specifications (in accordance with the lubrication table)?		10
Have measures been taken to ensure that the gear units are sufficiently ventilated and that they are not heated by an external heat source (e.g. the coupling)? The cooling air may not exceed a temperature of 40°C.		4.3 and 4.10
Does the mounting position correspond to the specification on the nameplate? Note: Contact SEW-EURODRIVE before you change the mounting position. Otherwise, the ATEX certification may not be valid.		4.3
Does the oil level for this mounting position comply with the information on the nameplate?		4.3
Do you have ready access to all oil filling and oil draining screws and the breather plug and ventilation?		4.3
Do all installed drives and drive components have ATEX certification?		4 and 5
Have you checked that the values on the nameplate of the gear unit are not exceeded?		5
When installing gear units with hollow shaft and shrink disc: • Was the protective cover installed according to the instructions?		4.6 and 4.7
When installing a motor to the input shaft using a V-belt drive: • Does the belt have sufficient attenuation resistance (< 10^9 Ω) between the input shaft and the motor shaft? • Before installing a protective cover: Has the manufacturer of the protective cover performed a risk analysis to prove that no sources of ignition or combustion (e.g. risk of sparks from grinding) can occur? (If you are not using the protective cover from SEW-EURODRIVE)		5.7
For motors with mains operation: • Check that the data specified on the nameplate of the gear unit and the motor corresponds to real conditions at the location where the drive is to be installed.		5

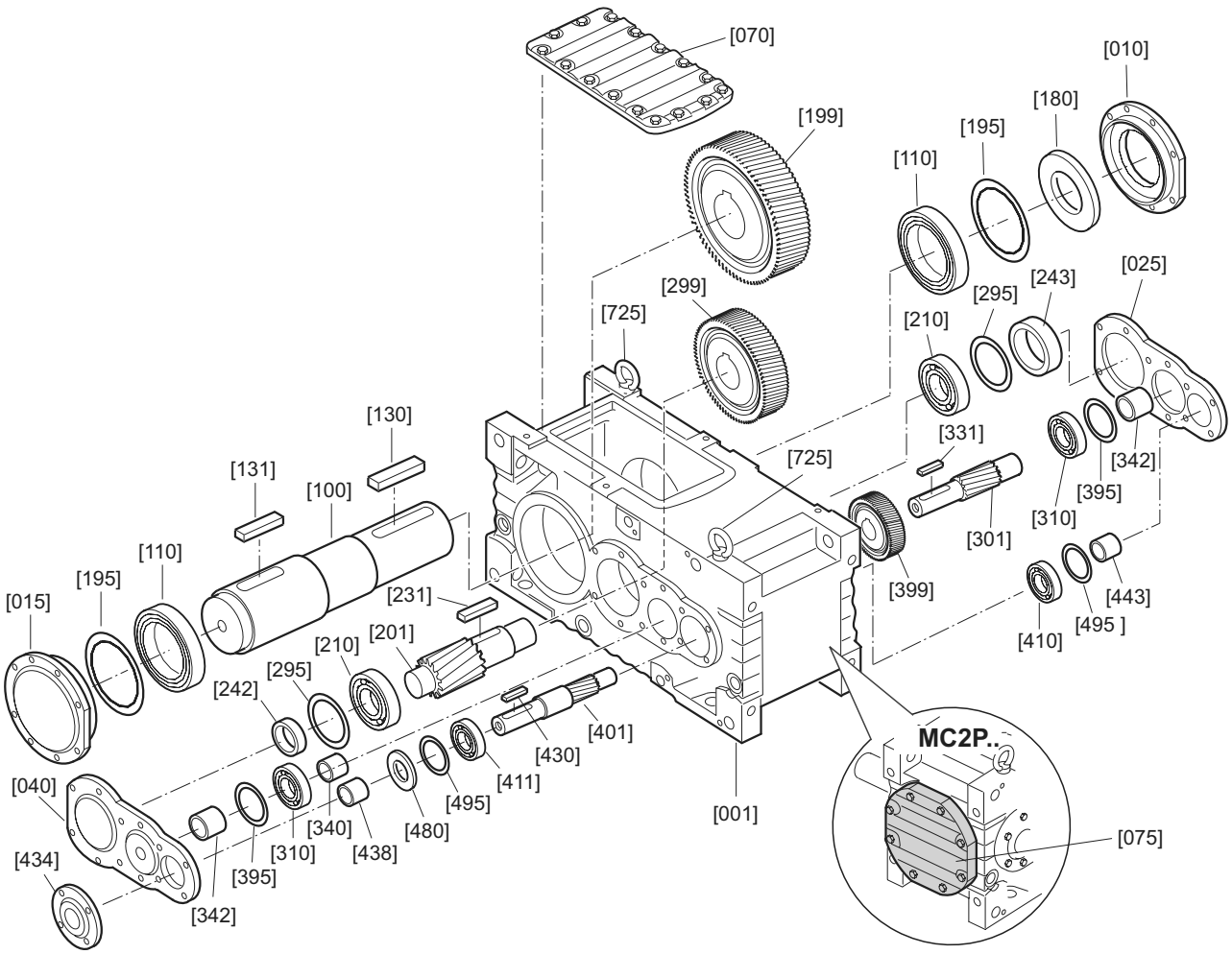
During startup This checklist contains an overview of all of the points that must be checked **during startup** of a gear unit in a potentially explosive area in accordance with Directive 94/9/EC.

Check the following points during gear unit start up in a potentially explosive area	Check	Information in section ...
Measure the oil temperature after approx. 6 hours. The temperature may not differ from the ambient temperature by more than 70 K. If the value is > 70 K, switch the drive off immediately and contact SEW-EURODRIVE.		5.4
Measure the oil temperature. Add 10 K to the measured value. Base the oil replacement intervals on this value.		5.4

3 Gear Unit Design

The following figures serve as an assignment aid for the spare parts list. Discrepancies may exist depending on the gear unit size and version.

3.1 Basic design of MC..P.. series industrial gear units



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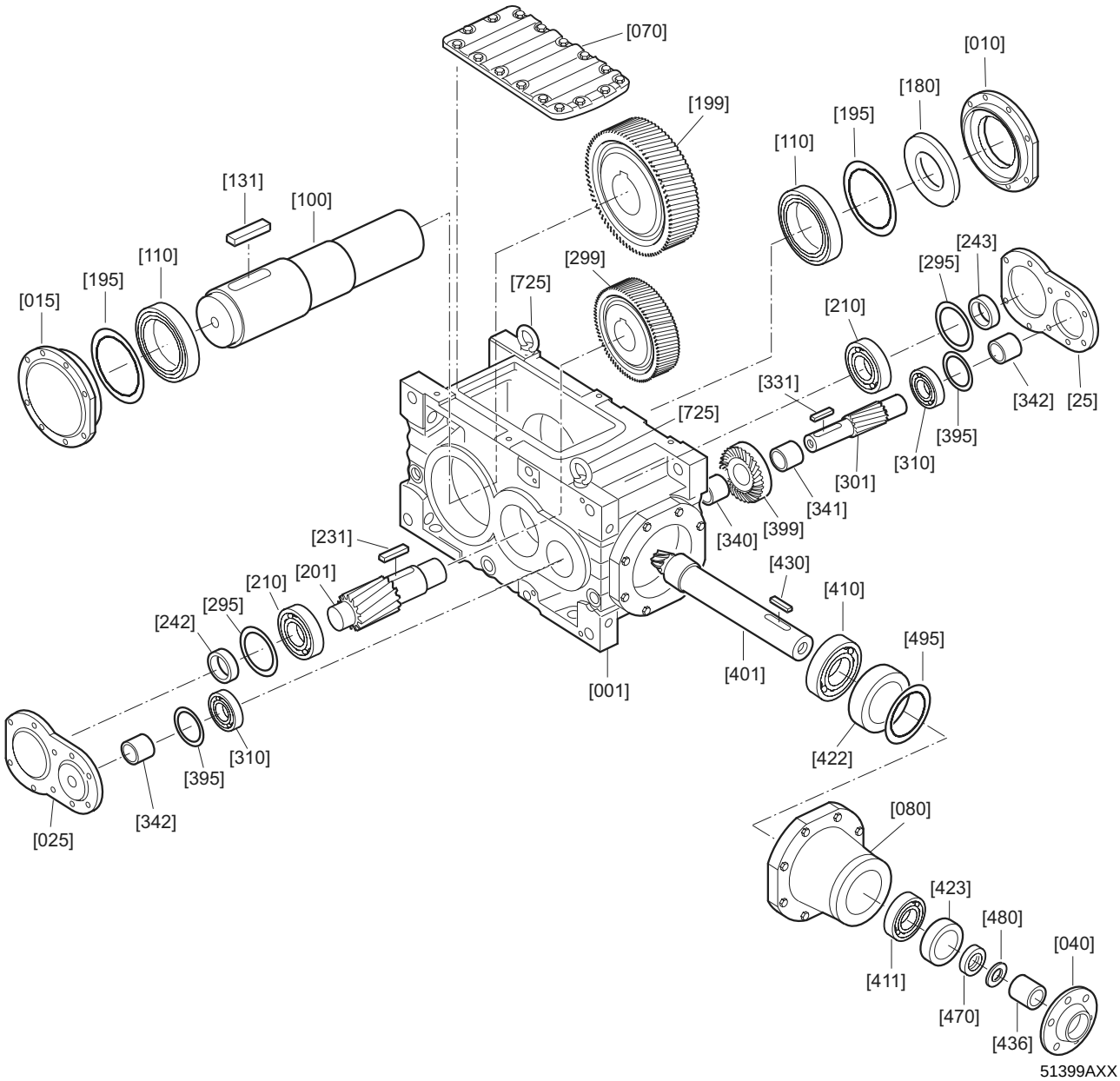
[001] Gear unit housing
[010] Bearing cover
[015] Bearing cover
[025] Bearing cover
[040] Bearing cover
[070] Gear cover plate
[075] Cover plate
[100] Output shaft
[110] Bearing
[130] Key
[131] Key
[180] Oil seal
[195] Shim
[199] Final gear
[201] Pinion shaft
[210] Bearing
[231] Key
[242] Spacer
[243] Spacer
[295] Shim
[299] Wheel
[301] Pinion shaft
[310] Bearing
[331] Key
[340] Spacer
[342] Spacer
[395] Shim
[399] Gearwheel
[401] Input shaft
[410] Bearings
[411] Roller bearings
[430] Key
[434] Cover
[438] Socket
[443] Distance bushing
[480] Oil seal
[495] Shim
[725] Lifting eyebolt

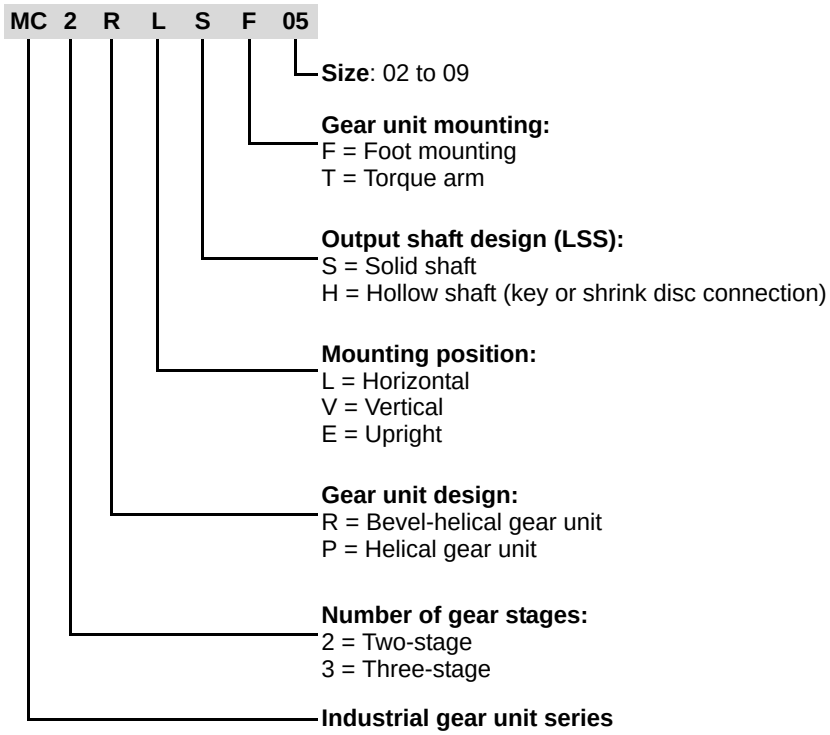
3.2 Basic design of MC..R.. series industrial gear units



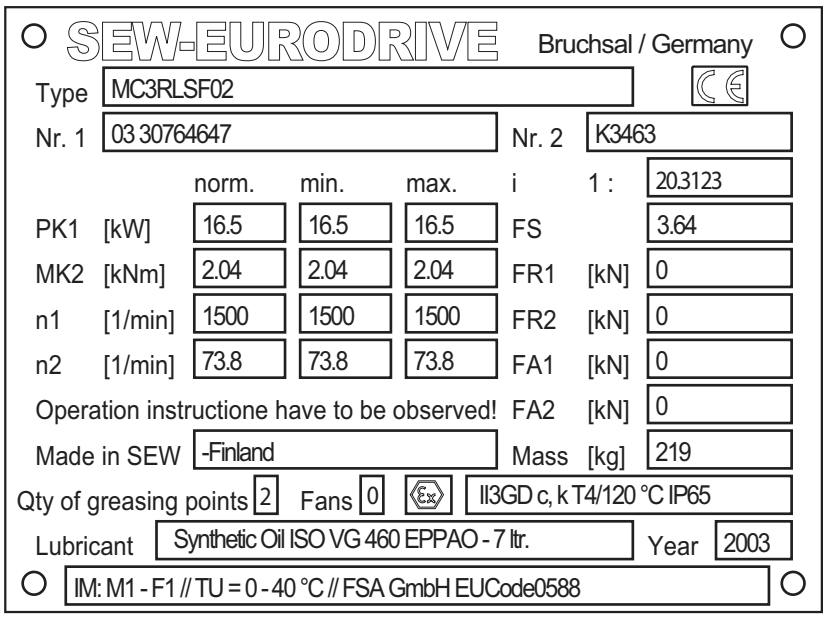
[001] Gear unit housing	[131] Key	[299] Wheel	[410] Bearing
[010] Bearing cover	[180] Oil seal	[301] Pinion shaft	[411] Bearing
[015] Bearing cover	[195] Shim	[310] Bearing	[422] Bearing bushing
[025] Bearing cover	[199] Final gear	[331] Key	[423] Bearing bushing
[040] Cover	[201] Pinion shaft	[340] Spacer	[430] Key
[070] Gear cover plate	[210] Bearing	[341] Spacer	[436] Bushing
[080] Bearing cover	[231] Key	[342] Spacer	[470] Clamping nut
[100] Output shaft	[242] Spacer	[395] Shim	[480] Oil seal
[110] Bearing	[243] Spacer	[399] Helical-bevel	[495] Shim
[130] Key	[295] Shim	[401] Bevel pinion shaft	[725] Lifting eyebolt

3.3 Unit designation, nameplates

Example of unit designation


MC 2 R L S F 05
Size: 02 to 09
Gear unit mounting:
F = Foot mounting
T = Torque arm
Output shaft design (LSS):
S = Solid shaft
H = Hollow shaft (key or shrink disc connection)
Mounting position:
L = Horizontal
V = Vertical
E = Upright
Gear unit design:
R = Bevel-helical gear unit
P = Helical gear unit
Number of gear stages:
2 = Two-stage
3 = Three-stage
Industrial gear unit series

Example: Nameplate of the SEW-EURODRIVE MC series industrial gear unit


SEW-EURODRIVE
Bruchsal / Germany
Type MC3RLSF02
Nr. 1 03 30764647
Nr. 2 K3463
norm. min. max. i 1 : 20.3123
PK1 [kW] 16.5 16.5 16.5 FS 3.64
MK2 [kNm] 2.04 2.04 2.04 FR1 [kN] 0
n1 [1/min] 1500 1500 1500 FR2 [kN] 0
n2 [1/min] 73.8 73.8 73.8 FA1 [kN] 0
Operation instructione have to be observed! FA2 [kN] 0
Made in SEW -Finland Mass [kg] 219
Qty of greasing points 2 Fans 0
II3GD c, k T4/120 °C IP65
Lubricant Synthetic Oil ISO VG 460 EPPAO - 7 ltr. Year 2003
IM: M1 - F1 // TU = 0 - 40 °C // FSA GmbH EUCode0588

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Design		Unit designation
No. 1		Serial number 1
No. 2		Serial number 2
P_{K1}	[KW]	Gear unit force
M_{K2}	[kNm]	Gear unit output torque
n_1	[rpm]	Input speed (HSS)
n_2	[rpm]	Output speed (LSS)
Norm.		Normal operating point
Min.		Operating point at minimum speed
Max.		Operating point at maximum speed
i		Exact gear unit reduction ratio
F_S		Service factor
F_{R1}	[kN]	Actual overhung load on input shaft
F_{R2}	[kN]	Actual overhung load on output shaft
F_{A1}	[kN]	Actual axial load on input shaft
F_{A2}	[kN]	Actual axial load on output shaft
Weight	[kg]	Weight of the gear unit
No. of lube points:		Number of points that require re-greasing
Fan		Number of fans installed
Lubricant		Oil grade and viscosity class/oil volume
Year		Year of construction
IM		Mounting position: Housing alignment and mounting surface variants
TU		Permitted ambient temperature

3.4 Mounting positions

The following features uniquely define the mounting position and corresponding design of MC.. series gear units:

- Mounting surface (F1 to F6) → Section 3.5
- Housing orientation (M1 to M6) → Section 3.6

  In addition, the shaft position (0 to 4) has to be defined → Section 3.7.

  The horizontal output shaft (L), vertical output shaft (V) and upright mounting (E) gear unit designs refer to the housing orientation.

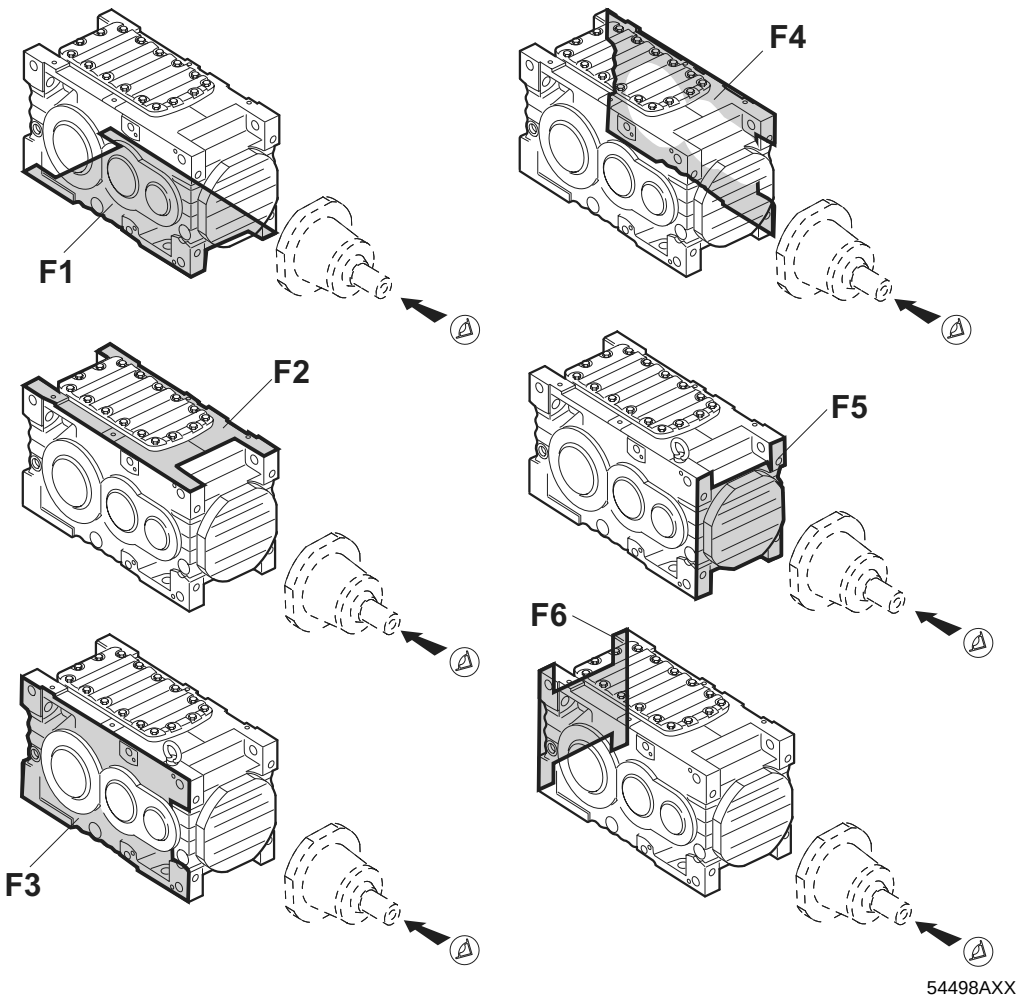
3.5 Mounting surface

Definition

The mounting surface is defined as the surface(s) of the foot or flange mounted gear unit that the customer's machine is mounted on.

Designations

Six different mounting surfaces were defined (designation "F1" to "F6"):



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3.6 Housing orientation M1 to M6

The housing orientation is defined as the position of the housing in space and is identified using the designations M1 to M6.

Each housing orientation corresponds to a certain

- Gear unit design (L, V, E)
- Standard mounting surface (F1 to F6)

The housing orientation is defined separately for

- **Helical gear units MC.P..**
- **Bevel-helical gear units MC.R..**

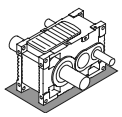
Unless specified otherwise, the standard **dependency** of

- gear unit design and
- housing orientation, and
- mounting surface

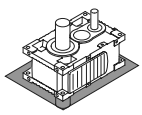
is as follows (for foot mounted gear units):

Standard assignment of gear unit design and mounting surface

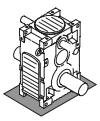
MC..**PL**: M1, F1



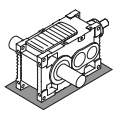
MC..**PV**: M5, F3



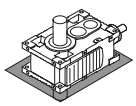
MC..**PE**: M4, F6



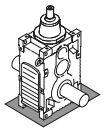
MC..**RL**: M1, F1



MC..**RV**: M5, F3



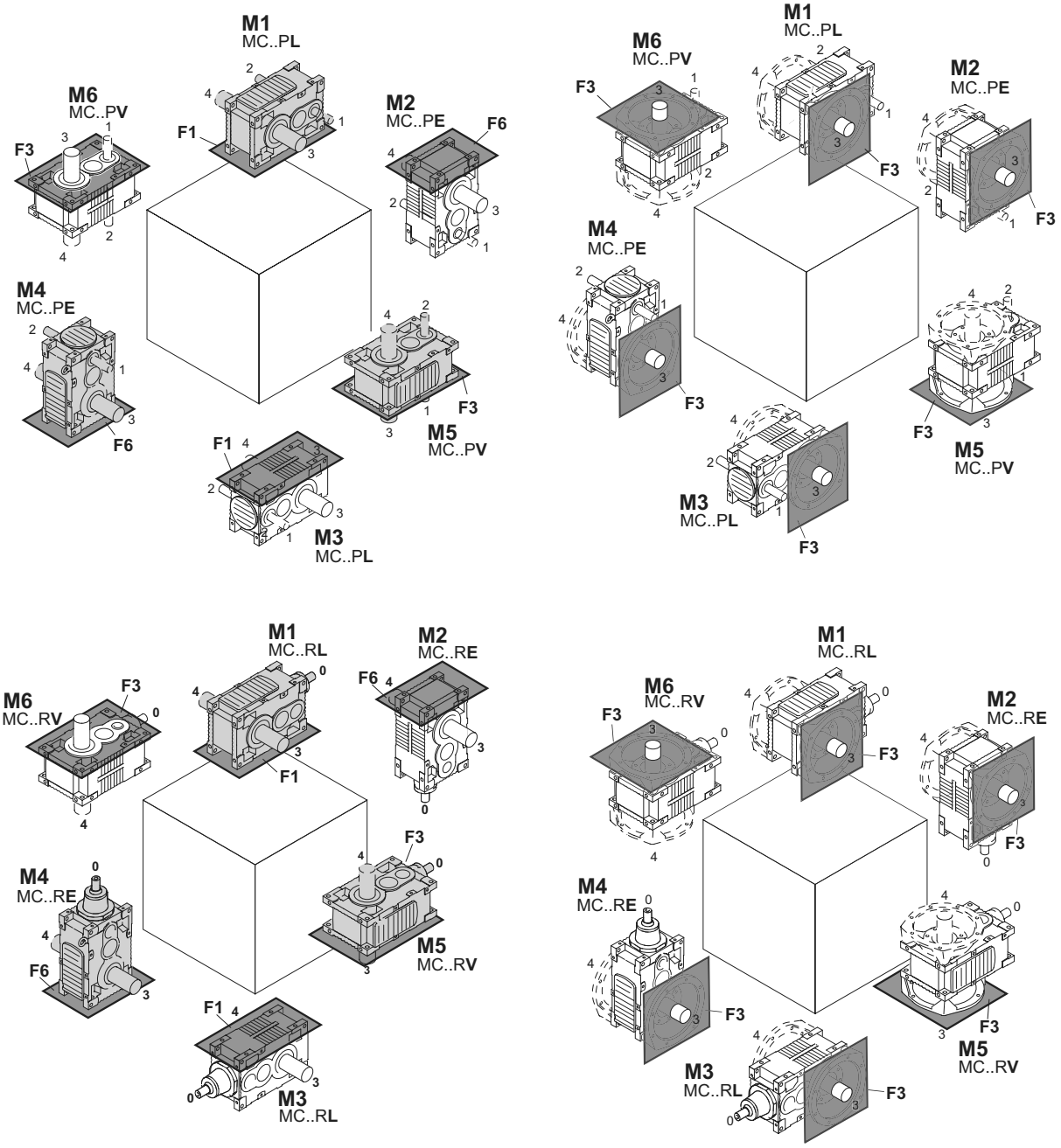
MC..**RE**: M4, F6



For gear units with mounting flange on the output shaft, the standard position of the flange depends on the shaft position of the output shaft unless specified otherwise:

- Shaft position 3 → Output shaft mounting flange F3
- Shaft position 4 → Output shaft mounting flange F4

Housing orientation and standard mounting surface



- The gear units marked in gray are standard design.
- Other mounting surfaces are possible in conjunction with a certain housing orientation. Refer to the order-specific dimension drawing.

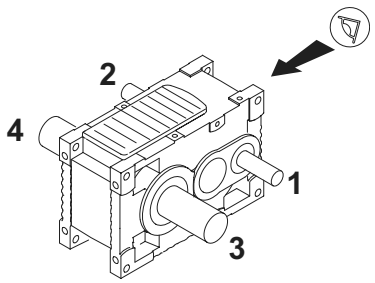
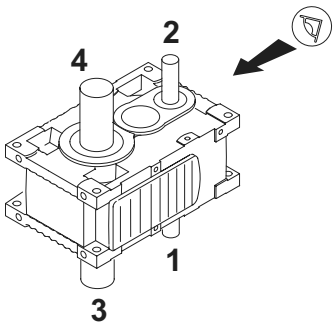
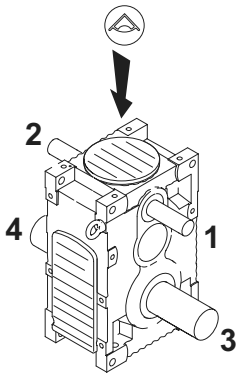
The housing orientation and/or mounting surface may not differ from the order.

3.7 Shaft positions

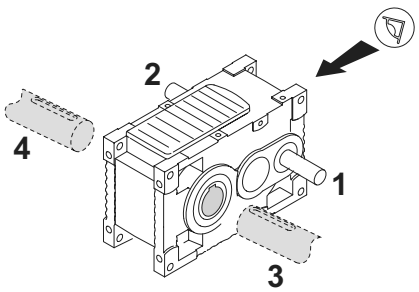
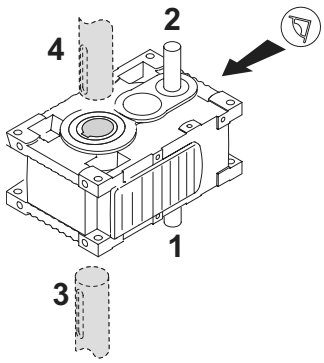
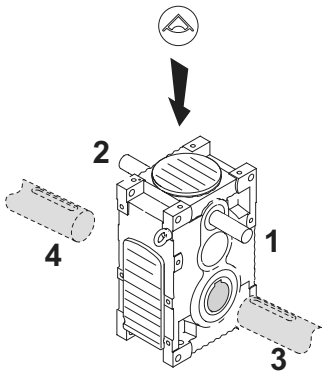
The shaft positions (0, 1, 2, 3, 4) and rotation direction dependencies shown in the following figures apply to **solid shaft and hollow shaft design** output shafts (LSS). For other shaft positions or gear units with backstop, contact SEW-EURODRIVE.

The following mounting positions (0, 1, 2, 3, 4) are possible:

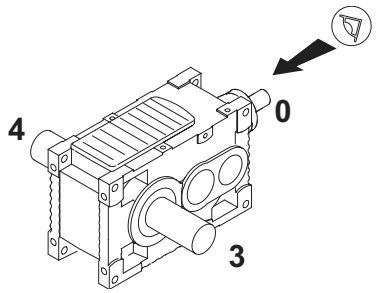
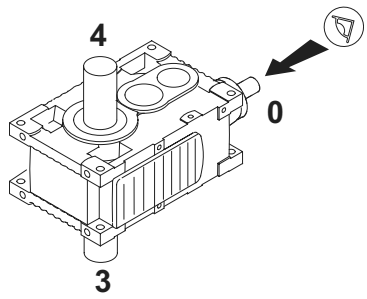
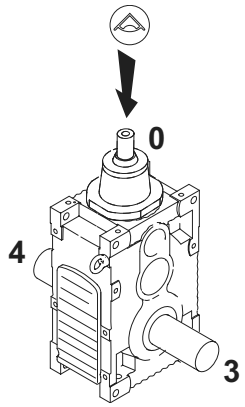
Shaft positions MC.P.S..

Housing orientation		
M1	**M5**	**M4**
Gear unit design		
Horizontal output shaft (L)	**Vertical output shaft (V)**	**Upright mounted (E)**
		

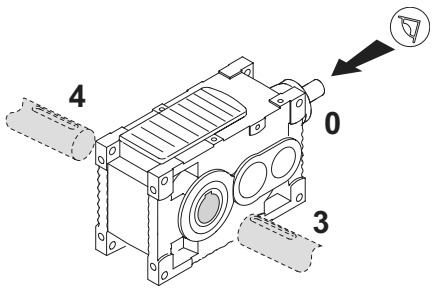
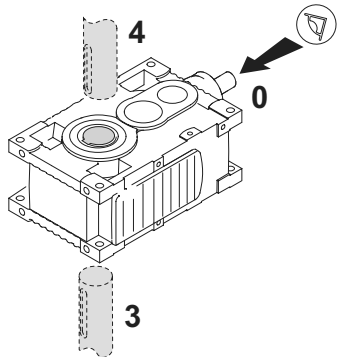
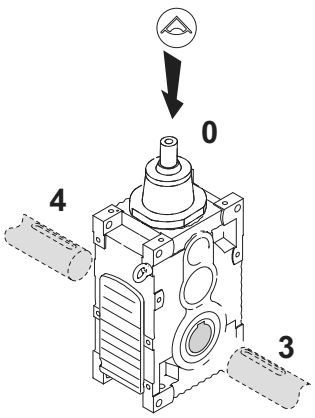
Shaft positions MC.P.H..

Housing orientation		
M1	**M5**	**M4**
Gear unit design		
Horizontal output shaft (L)	**Vertical output shaft (V)**	**Upright mounted (E)**
		

Shaft positions MC.R.S..

Housing orientation		
M1	**M5**	**M4**
Gear unit design		
Horizontal output shaft (L)	**Vertical output shaft (V)**	**Upright mounted (E)**
		

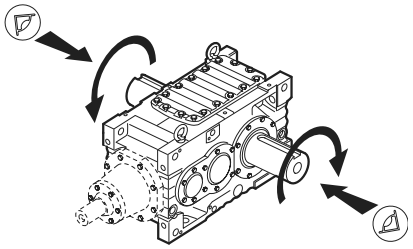
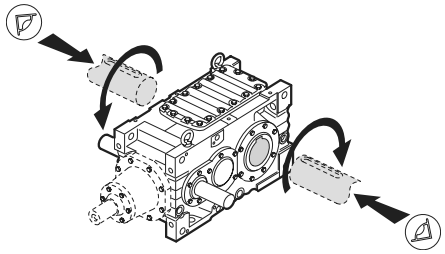
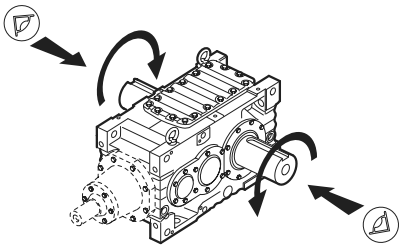
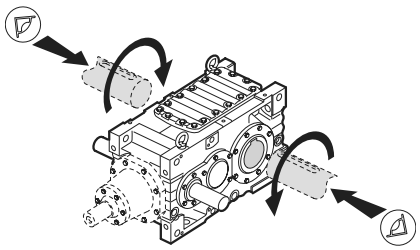
Shaft positions MC.R.H..

Housing orientation		
M1	**M5**	**M4**
Gear unit design		
Horizontal output shaft (L)	**Vertical output shaft (V)**	**Upright mounted (E)**
		

3.8 Direction of rotation

Directions of rotation

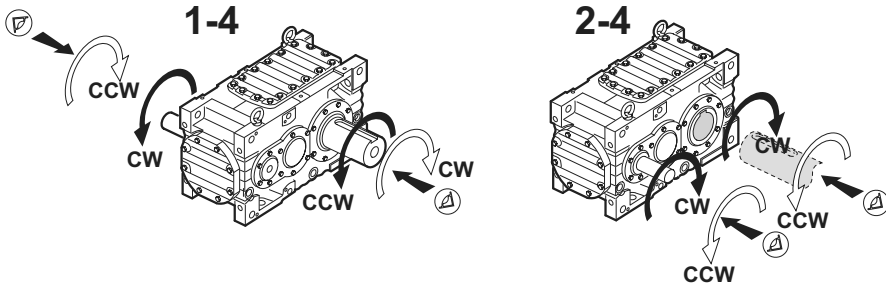
The directions of rotation of the outputs shaft (LSS) are defined as follows:

Direction of rotation	Gear unit design	
	MC.P.S.. MC.R.S..	MC.P.H.. MC.R.H..
Clockwise (CW)	 52036AXX	 51383AXX
Counter-clockwise (CCW)	 52037AXX	 51386AXX

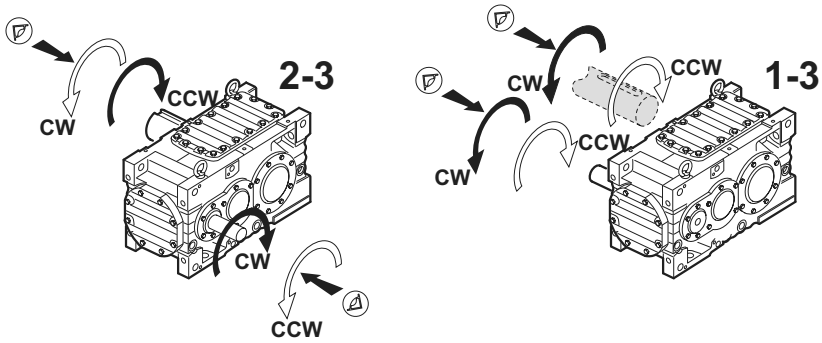
MC2P.. shaft positions and direction of rotation dependencies

The following figures show shaft positions and direction of rotation dependencies for MC2P.. series industrial gear units.

2-stage



51391AXX

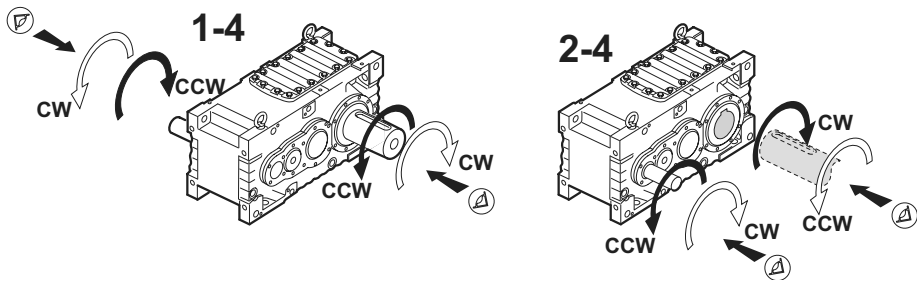


51392AXX

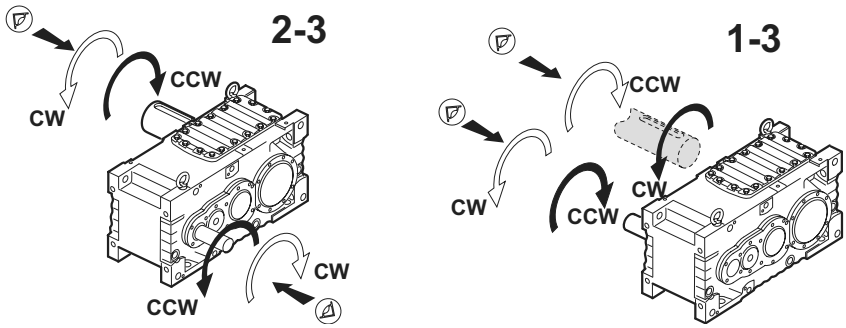
MC3P.. shaft positions and direction of rotation dependencies

The following figures show shaft positions and direction of rotation dependencies for MC3P.. series industrial gear units.

3-stage



52038AXX

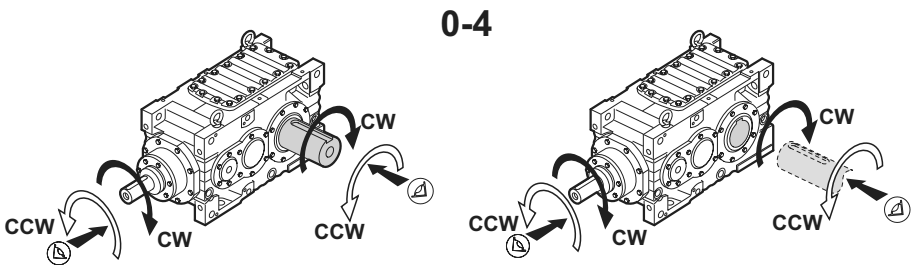


52039AXX

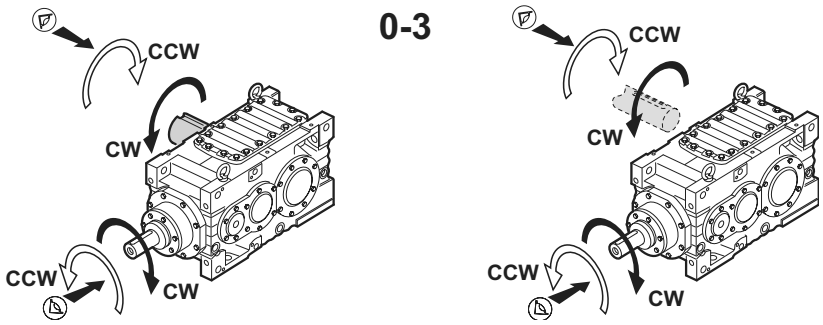
MC.R.. without backstop shaft positions and direction of rotation dependencies

The following figures show shaft positions and direction of rotation dependencies for MC.R.. two- and three-stage series industrial gear units without backstop.

2- and 3-stage



51389AXX

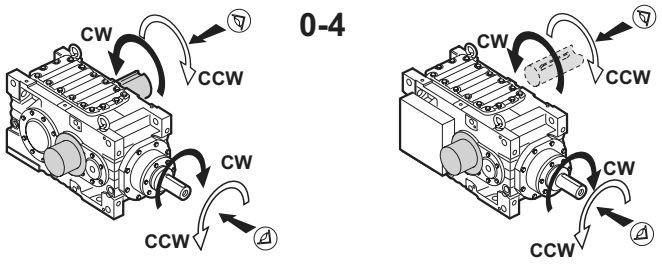


51390AXX

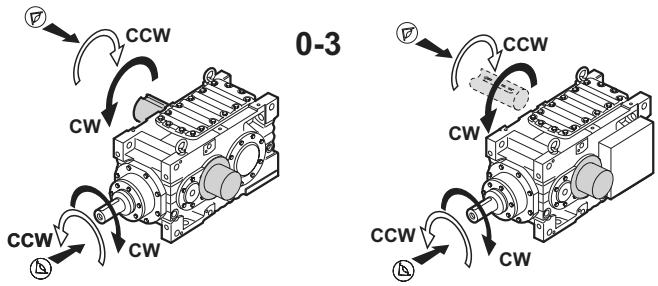
Shaft positions and direction of rotation of MC2RS.. / MC2RH.. keyway with backstop

Following figures show the shaft positions and direction of rotation dependencies for 2-stage gear units with backstop type MC.RS..and MC.RH.. with keyway.

2-stage



55950AXX



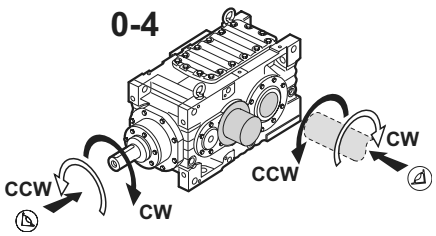
55951AXX

Only one direction of rotation is possible, which has to be specified in the order. The permitted direction of rotation is indicated on the housing.

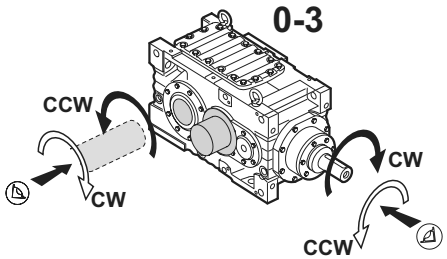
Shaft positions and direction of rotation MC2RH.. /SD gear units with shrink disc and backstop

Following figures show the shaft positions and direction of rotation dependencies for 2-stage gear units with backstop type MC.RS.. and shrink disc.

2-stage



55952AXX



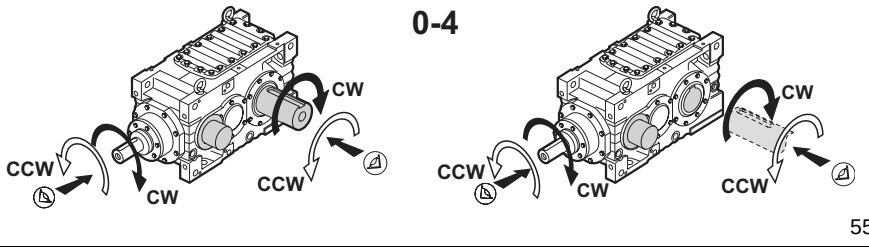
55953AXX

Only one direction of rotation is possible, which has to be specified in the order. The permitted direction of rotation is indicated on the housing.

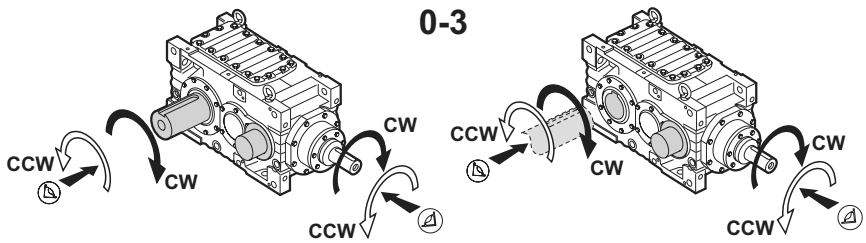
MC3R shaft positions and direction of rotation, backstop on driven machine end.

Following figures show the shaft positions and direction of rotation dependencies for 3-stage gear units with backstop type MC.3R..

3-stage



55954AXX



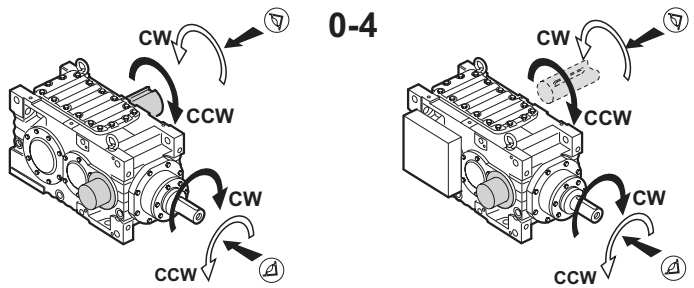
55956AXX

Only one direction of rotation is possible, which has to be specified in the order. The permitted direction of rotation is indicated on the housing.

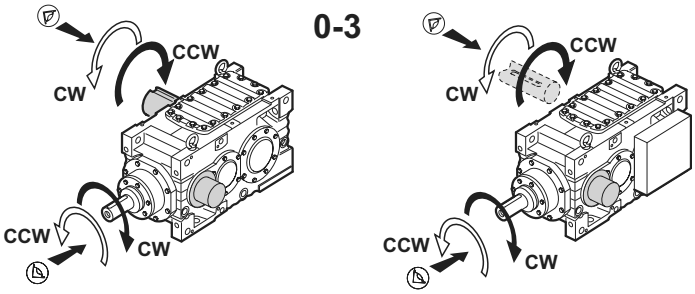
MC3R shaft positions and directions of rotation, backstop opposite driven machine

Following figures show the shaft positions and directions of rotation for gear units with backstop type MC3R.

3-stage



55957AXX



55958AXX

Only one direction of rotation is possible, which has to be specified in the order. The permitted direction of rotation is indicated on the housing.

3.9 Lubrication of industrial gear units

Depending on the mounting position, "splash lubrication" or "bath lubrication" lubrication types are used for MC.. series industrial gear units.

Splash lubrication

Splash lubrication is used as standard for MC.. series industrial gear units in the horizontal mounting position (unit designation MC..**L**..). With splash lubrication, the oil level is low. With this lubrication method, oil is splashed onto the bearings and gearing components.

Oil bath lubrication

Oil bath lubrication is used for MC.. series industrial gear units in the horizontal mounting position (unit designation MC..**V**..) and upright mounting position (unit designation MC..**E**..). With oil bath lubrication, the oil level is so high that the bearings and gearing components are completely immersed in the lubricant.

Oil expansion tanks are always used for MC.PV.., MC.RV.,. and MC.RE.. series industrial gear units **with oil bath lubrication**. Oil expansion tanks allow the lubricant to expand when the gear unit heats up during operation.

Regardless of the mounting position, a steel oil expansion tank is used if the unit is installed outdoors and ambient conditions are very humid. The oil expansion tank can be used both for the version with solid shaft and hollow shaft. A membrane in the oil expansion tank separates the oil in the gear unit from the humid ambient air. This ensures that no humidity can build up in the gear unit.

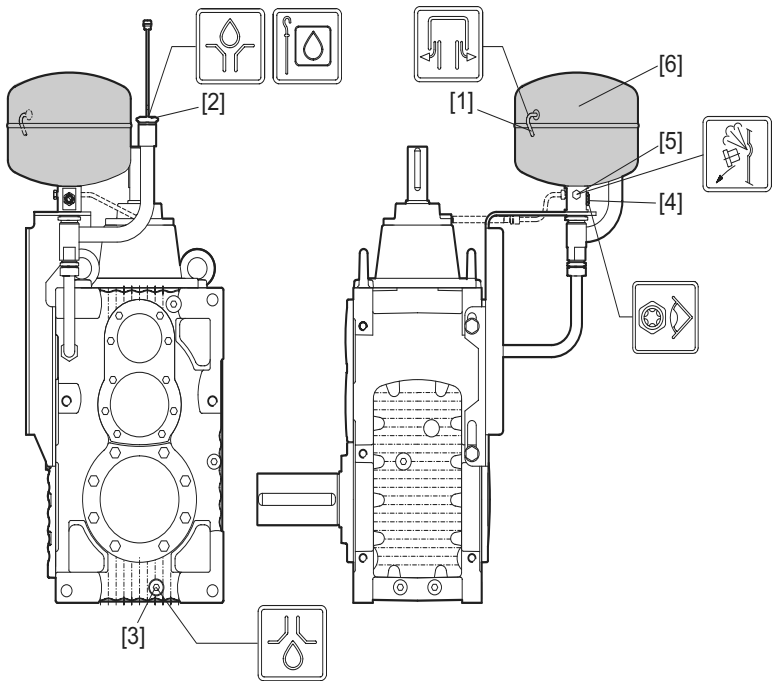
Symbols used

The following table shows the symbols used in the following figures and what they mean:

Symbol	Meaning
	Breather plug
	Inspection opening
	Oil dipstick
	Oil draining screw
	Oil filling screw
	Oil sight glass
	Air outlet screw

Oil bath lubrication upright mounting position

The steel oil expansion tank (6) is used for **MC.. series industrial gear units in the upright mounting position** (unit designation **MC.PE..** or **MC..RE..**).

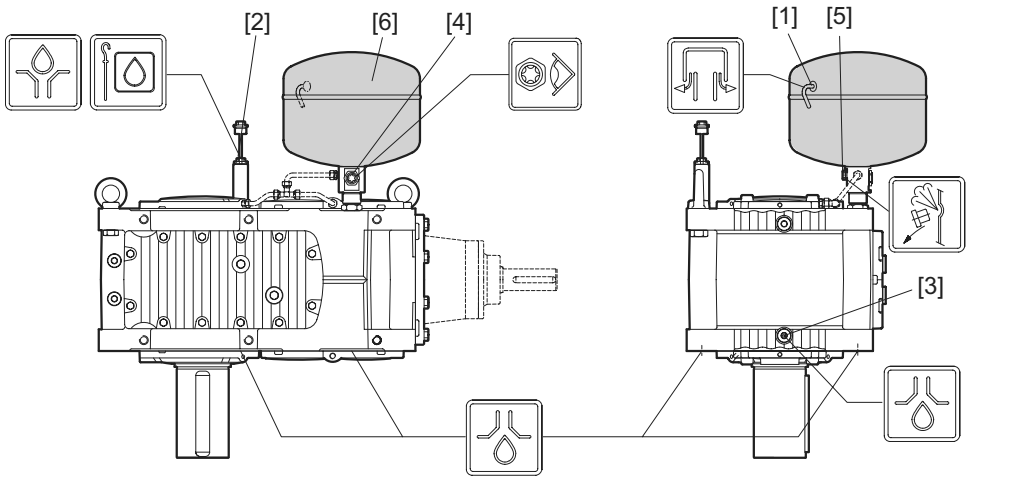


51586AXX

[1] Breather
[2] Oil dipstick
[3] Oil draining screw
[4] Oil sight glass
[5] Air outlet screw
[6] Steel oil expansion tank

Oil bath lubrication vertical mounting position

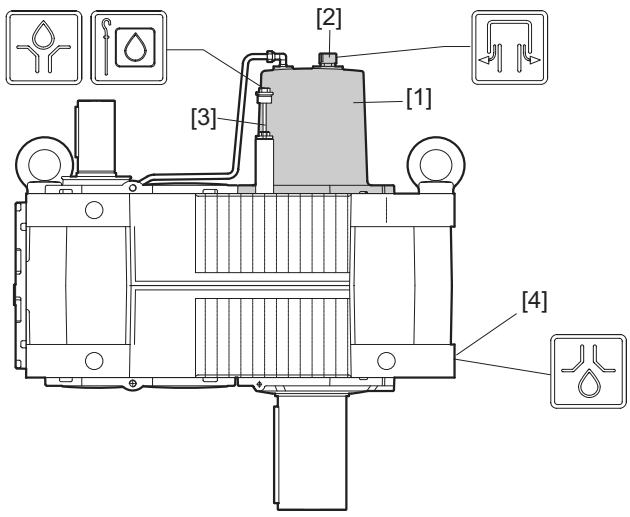
The steel oil expansion tank (6) for **MC.. series industrial gear units in the vertical mounting position** (unit designation **MC.PV..** / **MC.RV..**) is located on the side of the cover plate.



51588AXX

[1] Breather
[2] Oil dipstick
[3] Oil draining screw
[4] Oil sight glass
[5] Air outlet screw
[6] Steel oil expansion tank

A **gray-cast iron oil expansion tank** [1] is used when the **environmental conditions are dry**. This oil expansion tank is only used for the vertical mounting position with the **solid output shaft pointing downwards** (unit designation MC.P**VSF**.. or MC.R**VSF**..).



51589AXX

[1] Gray-cast iron oil expansion tank
[2] Breather plug
[3] Oil dipstick
[4] Oil draining screw

Pressure lubrication

You can specify the pressure lubrication method in your order **regardless of the mounting position**.

With pressure lubrication, the oil level is low. For sizes 04 to 09, the gearing and bearings not immersed in the oil bath are lubricated using a shaft end pump (→ "Shaft End Pump" section). A motor pump is used for sizes 02 to 09 (→ "Motor Pump" section).

"Pressure lubrication" is used if:

- Oil bath lubrication is not required for horizontal or vertical mounting positions
- Speeds are very high
- The gear unit must be cooled by an external oil/water (→ "Oil/Water Cooling System" section) or oil/air cooling system (→ "Oil/Air Cooling System" section).

For more details on oil expansion tanks, refer to the "Mounting Positions" section.

4 Mechanical Installation

4.1 Required tools/resources

Not included in the scope of delivery:

- Set of wrenches
- Torque wrench (for shrink discs)
- Mounting the motor on the motor adapter
- Mounting device
- Shims and distance rings if leveling necessary
- Fixing devices for input and output elements
- Lubricant (e.g. NOCO® fluid from SEW-EURODRIVE)
- For hollow shaft gear unit (→ "Assembly/Disassembly of Hollow Shaft Gear Units with Keyed Connection): Threaded rod, nut (DIN 934), retaining screw, and ejector screw
- Mount the parts according to the gear unit diagrams shown in the "Gear Unit Foundation" section.

Installation tolerances

Shaft end	Flange
Diameter tolerance in accordance with DIN 748 • ISO k6 for solid shafts with ∅ ≤ 50 mm • ISO m6 for solid shafts with ∅ > 50 mm • ISO H7 for hollow shafts for shrink disc • ISO H8 for hollow shafts with keyway • Center hole in accordance with DIN 332, shape DS..	Centering shoulder tolerance: • ISO js7 / H8

4.2 Prerequisites for installation

Make sure that

- the drive was not damaged during transportation and storage
- the following requirements have been fulfilled:
  - Ambient temperature complies with the specifications on the nameplate
    The drive may not be assembled under the following ambient conditions:
    - Potentially explosive area
    - Oils
    - Acids
    - Gases
    - Vapors
    - Radiation
- You must clean the output shafts and flange surfaces thoroughly to make sure they are free of anti-corrosion agents, contamination, etc. Use a commercially available solvent. Do not let the solvent come into contact with the sealing lips of the oil seals risk of damage to the material!
- When the drive is installed in aggressive ambient conditions, protect the output end oil seals against wear.

4.3 Installing the gear unit

- **You must observe the safety notes in the previous sections.**
- **Installation must be done with great care by qualified personnel. Damage due to improper handling leads to exclusion of liability.**
- **The gear unit or gearmotor may only be mounted/installed in the specified mounting position on a level, vibration damping and torsionally rigid support structure. Do not tighten the housing legs and mounting flanges against one another in the process!**
- **Work on the gear unit only when the machine is not in use. Prevent the drive unit from being accidentally switched on (e.g. by locking the keyswitch or removing the fuses from the power supply). Put a sign at the on-switch to warn that the gear unit is being worked on.**
- **The oil checking and drain screws and the breather valves must be freely accessible.**
- **Use plastic inserts (2 - 3 mm thick) if there is a risk of electrochemical corrosion between the gear unit and the driven machine (connection between different metals such as cast iron and high-grade steel). Also fit the bolts with plastic washers. Ground the housing additionally.**
- **Before startup, check whether the oil fill is in accordance with the specified mounting position, (→ information on the nameplate and section 6.2).**
- **The mounting position may only be changed after SEW-EURODRIVE has been consulted. Otherwise, the ATEX certification becomes void.**
- **Welding work may not be done on the complete drive. Do not use the drive as a mass point for welding work. Welding may destroy gearing parts and the bearings.**
- **Protect rotating drive parts like the coupling, gears, or belt drive using suitable devices that protect from contact.**
- **Units installed outdoors must be protected from the sun. Suitable protective devices like covers, roofs, etc. are required. When using these, avoid heat accumulation.**
- **Gear units are supplied with suitable coating for use in damp areas or in the open air. Any damage to the coating (e.g. on the breather valve) must be repaired.**
- **Pull the coupling on using a mounting device only.**

Installation in damp locations or outdoors

The drives are available with increased corrosion and surface protection so that they can also be used in areas with high pollution or high humidity. Any damage to the coating must be repaired (e.g. on the breather valve).

4.4 Gear unit foundation

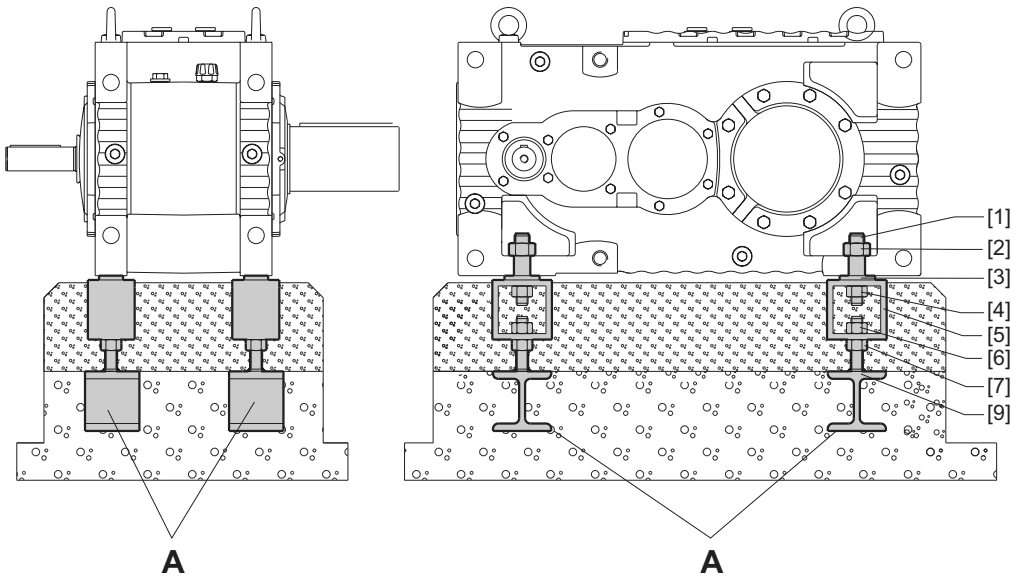
Foundation for foot-mounted gear units

To ensure quick and successful mounting, the correct type of foundation should be selected and the work carefully planned in advance. Foundation drawings with all necessary construction and dimension details should be available.

SEW-EURODRIVE recommends the types of foundations shown in the following figures. A customer's own foundation should be technically and qualitatively comparable to the type of foundation shown.

To avoid harmful vibrations and oscillations, adequate rigidity must be ensured when mounting the gear unit on a steel construction. The foundation must be designed according to the weight and torque of the gear unit and taking the forces acting on the gear unit into account.

Example 1

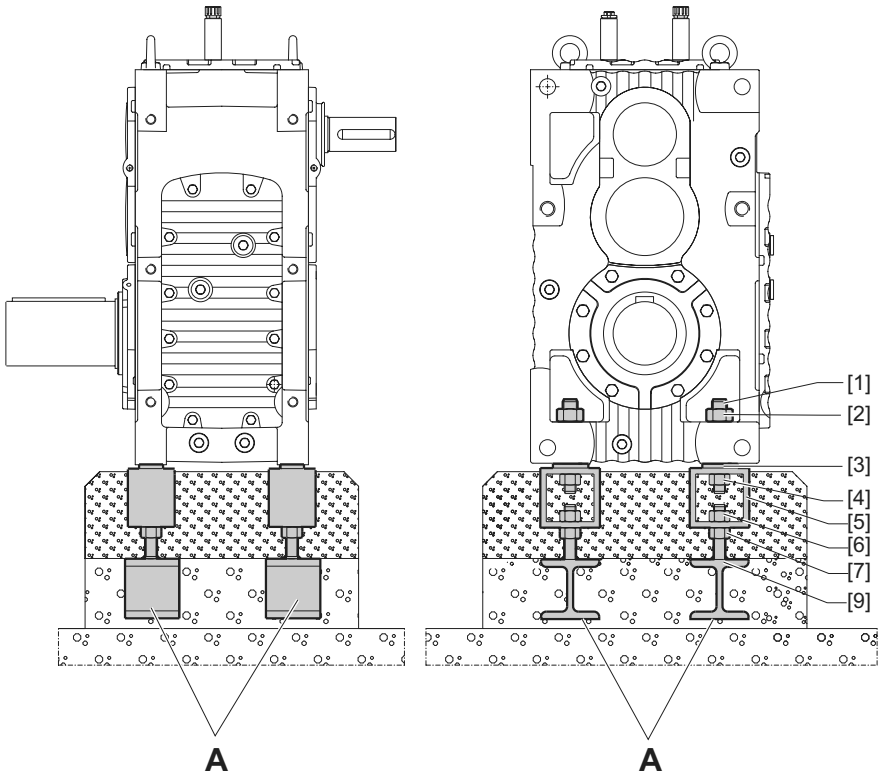


51403AXX

Pos. "A" → "Concrete base" section

[1] Hex head screw or stud
[2] Hexagonal nut if [1] is a stud or an upside-down screw
[3] Shims (approx. 3 mm space for shims)
[4] Hexagonal nut
[5] Foundation bracket
[6] Hexagonal nut
[7] Hexagonal nut and foundation screw
[9] Supporting girder

Example 2

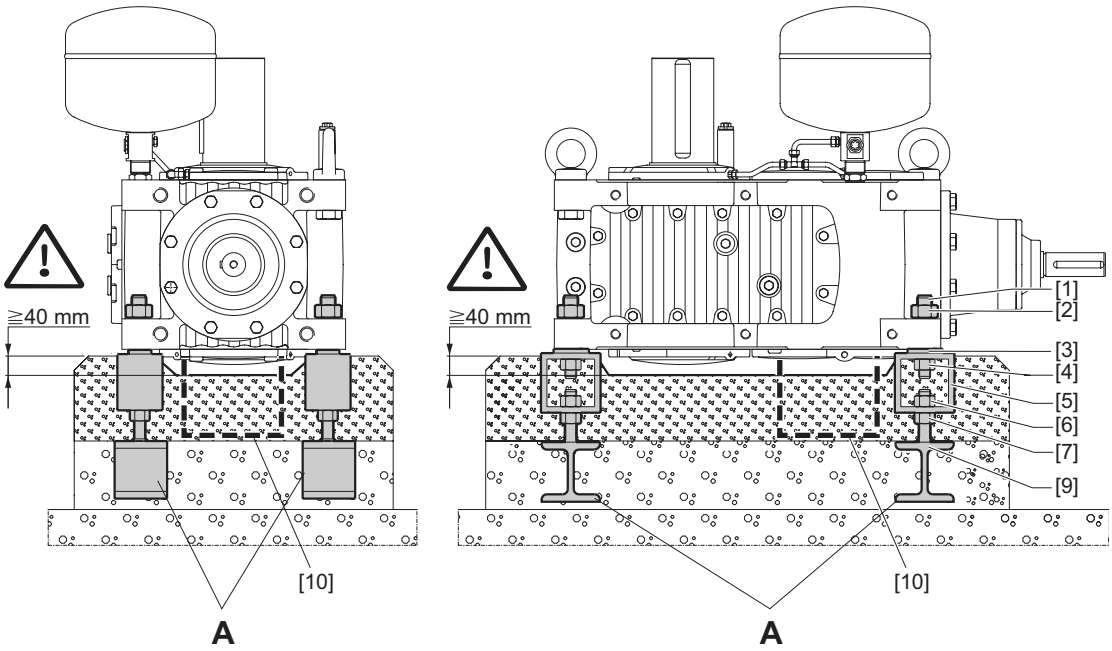


51406AXX

Pos. "A" → "Concrete Base" section

[1] Hex head screw or stud
[2] Hexagonal nut if [1] is a stud or an upside-down screw
[3] Shims (approx. 3 mm space for shims)
[4] Hexagonal nut
[5] Foundation bracket
[6] Hexagonal nut
[7] Hexagonal nut and foundation screw
[9] Supporting girder

Example 3



51413AXX

Pos. "A" → "Concrete Base" section

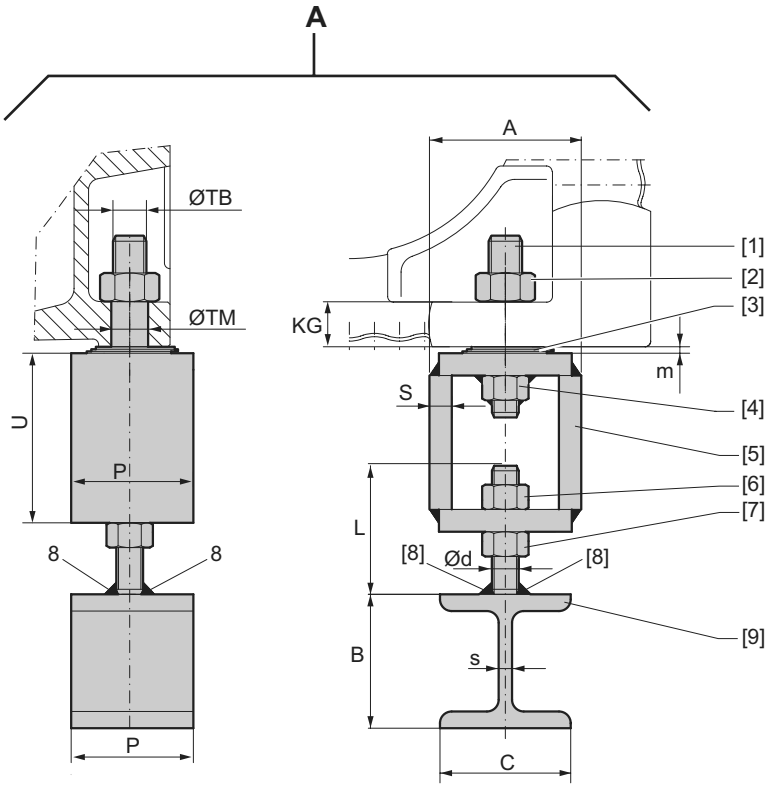
[1] Hex head screw or stud
[2] Hexagonal nut if [1] is a stud or an upside-down screw
[3] Shims (approx. 3 mm space for shims)
[4] Hexagonal nut
[5] Foundation bracket
[6] Hexagonal nut
[7] Hexagonal nut and foundation screw
[9] Supporting girder
[10] Shaft end pump (optional)

Important for MC.PV.. / MC.RV.. industrial gear units:

- **The mounting clearance between the bearing cover and gear unit foundation must be at least 40 mm.**
- **The mounting clearance must be dimensioned adequately if the gear unit is equipped with a shaft end pump [10] (→ "Shaft End Pump" section).**

Concrete base

The concrete base for the gear unit must be reinforced and connected with the concrete using steel clamps, steel rods or steel elements. Only the supporting girders are embedded in the concrete (Pos. "A" → following figure).



51404AXX

[1] Hex head screw or stud
[2] Hexagonal nut if [1] is a stud or an upside-down screw
[3] Shims (approx. 3 mm space for shims)
[4] Hexagonal nut
[5] Foundation bracket
[6] Hexagonal nut
[7] Hexagonal nut and foundation screw
[8] Welded joint
[9] Supporting girder

Dimensions

Gear unit size	Stud			Base plate					Foundation screws		Supporting girder			
	∅TB	∅TM	KG	m	P	U	A	S	∅d	L	P	B	C	s
	[mm]													
02	M20	24	28	3	120	120	120	20	M24	120	120	100		10
03														
04	M24	28	34											
05														
06	M30	33	40			150		30	M30	150		140		12
07														
08	M36	39	52											
09														

The minimum tensile strength of the supporting girders and foundation screws must be at least 350 N/mm^2.

Grouting

The density of the grouting must be equal to that of the base concrete. The grouting is connected with the concrete base using concrete reinforcement steel.

Before welding the weld seams [9], ensure that

- the concrete base around the supporting girder has dried,
- the gear unit with all mount-on components has been aligned to its final position.

Tightening torques

Screw / nut	Tightening torque screw / nut [Nm]
M8	19
M10	38
M12	67
M16	160
M20	315
M24	540
M30	1,090
M36	1,900

Counterflange for gear units in flange-mounted version

Gear units can be supplied with a mounting flange on the output shaft. These two types of flange are named according to their bearing assembly:

- "Mounting flange"
- "EBD mounting flange."

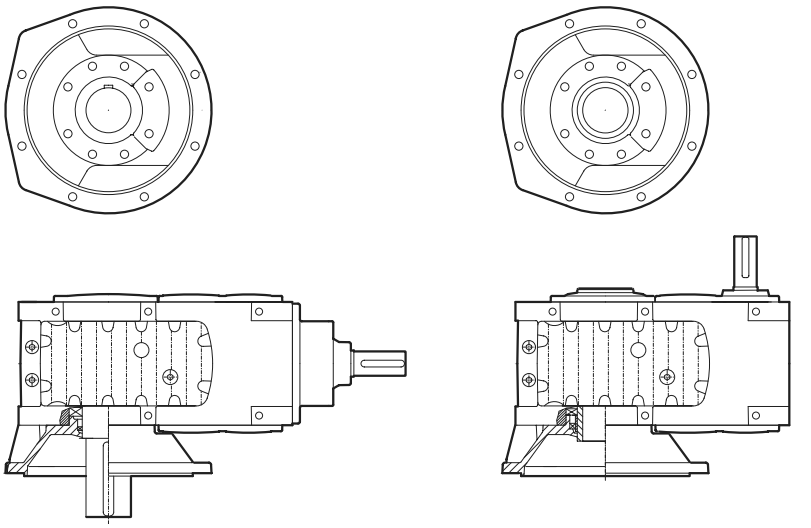
Both types of flange are suitable for all gear units and mounting positions:

- MC.L..
- MC.V..
- MC.E..

Mounting flange

Solid shaft LSS

Hollow shaft LSS



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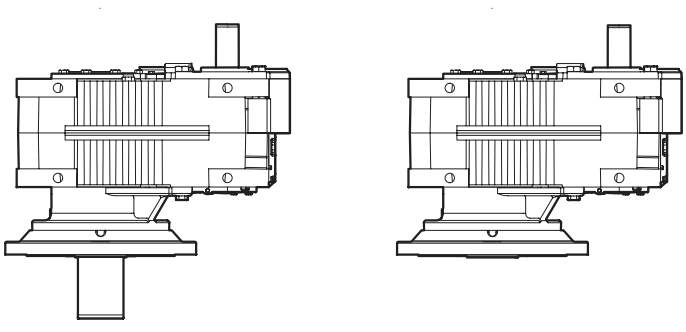
EBD mounting flange

Solid shaft LSS

Hollow shaft LSS



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The counterflange must have the following characteristics:

- Stiff and torsionally rigid taking into account
  - Gear unit weight
  - Motor weight
  - Torque to be transmitted
  - Additional forces from the customer machine acting on the gear unit (e.g. axial forces from and towards the gear unit resulting from a mixing process)
- Horizontal
- Smooth
- Vibration isolating, meaning that no vibrations should be transmitted from nearby machines and components
- Resonance vibrations may not be created
- A bore with an H7 fit, corresponding to the dimension drawing for the centering shoulder of the gear unit flange

The mounting surface of the mounting flange and counterflange must be absolutely free of grease, oil, and other contaminants (such as small textile particles, dust, etc.).

The gear drive output shaft must be aligned as accurately as possible in relation to the counterflange. Alignment affects the lifetime of bearings, shafts, and the coupling.

The incorrect positions permitted for the coupling of the output shaft can be seen either in section 5.2 or a separate manual on couplings.

Use screws of strength class 8.8 (tensile strength. 640 N/mm^2).

Gear unit size MC..	Mounting flange	EBD mounting flange
02	8 x M16	16 x M16
03	8 x M16	16 x M16
04	8 x M16	16 x M16
05	8 x M20	16 x M16
06	8 x M20	16 x M20
07	8 x M20	16 x M20
08	8 x M24	16 x M24
09	8 x M24	16 x M24

4.5 Mounting solid shaft gear units

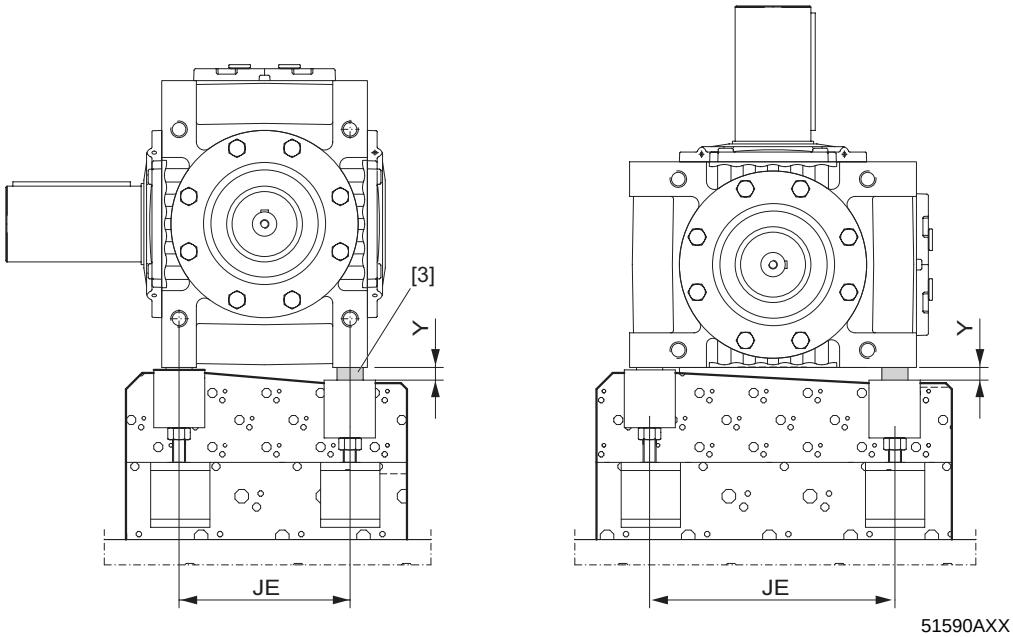
Only drive and drive components with ATEX certification are permitted, assuming that these components are covered by Directive 94/9/EC.

Before mounting the gear unit, check the foundation dimensions with those in the corresponding gear unit drawings in the "Gear Unit Foundation" section.

Mount the gear unit in the following sequence:

1. Mount the parts according to the gear unit diagrams shown in the "Gear Unit Foundation" section. The shims [3] facilitate later adjustment and mounting any replacement gear unit necessary.
2. Secure the gear unit at the selected positions on the supporting girders using three foundation screws. Position the foundation screws at the maximum distance possible (two screws on one side of the gear unit and one on the other side). Align the gear unit as follows:
   - Vertically by lifting, lowering or tilting the unit using the nuts of the foundation screws
   - Horizontally by tapping the foundation screws slightly in the required direction
3. After aligning the gear unit, tighten the three nuts of the foundation screws used for alignment. Carefully insert the fourth foundation screw into the supporting girder and tighten it securely. When doing so, make sure that the position of the gear unit does not change. If necessary, align the gear unit again.
4. Tack-weld the ends of the foundation screws to the supporting girders (at least three welding spots per foundation screw). Tack-weld the foundation screws alternately in both directions (starting from the center) and symmetrically to the gear unit's center line. This way, misalignment caused by the welding process is avoided. After all screws have been tack-welded, they must be permanently welded in the above-mentioned order. Adjust the nuts on the foundation screws to ensure that the welded foundation screws do not cause misalignment of the gear unit housing.
5. After the nuts of the retaining screws of the gear unit have been tack-welded, check the mounting work again and then cast the enclosure.
6. When the grouting has set, check the mounting one last time and adjust if necessary.

Mounting accuracy when aligning



When aligning the gear unit, make sure that the mounting tolerances for the flatness of the foundation are not exceeded (y_{max} values in the following table). If necessary, use shims [3] to align the gear unit on the foundation plate.

JE [mm]	y_{max} [mm]
< 400	0.035
400 to 799	0.060
800 to 1200	0.090
1200 to 1600	0.125

Flange-mounted gear units

Before mounting the gear unit, make sure that the requirements described in section 4.4 "Gear Unit Foundation - Counterflange for Gear Units in Flange-Mounted Design" have been fulfilled.

Mount the gear unit in the following sequence:

1. The gear unit must be lowered onto the counterflange with suitable hoisting equipment. Follow the instructions in section 2.
2. Fasten the gear unit to the counterflange in the correct position with flange bolts. Tighten them diagonally with full tightening torque (→ section 4.4).

4.6 Mounting/removing hollow shaft gears unit with keyed connection

The cover cannot be mounted for special uses, such as continuous shafts. In this case, the cover can be omitted if the machine or system manufacturer delivers suitable accessories that offer the enclosure specified in DIN EN 13463.

If special maintenance work is necessary for this, it must be described in the operating instructions corresponding to the machine or components.

Only drive components with ATEX certification are permitted, assuming that these components are covered by Directive 94/9/EC.

- The scope of delivery includes (→ refer to the figure on page 50):
  - Circlips [3], end plate [4]
- The scope of delivery does **not** include (→ refer to the figure on pages 50 and 51):
  - Threaded rod [2], nut [5], retaining screw [6], ejector screw [8]

Select the appropriate thread and length of the threaded rod as well as the retaining screw depending on the design of the customer's machine.

Thread sizes

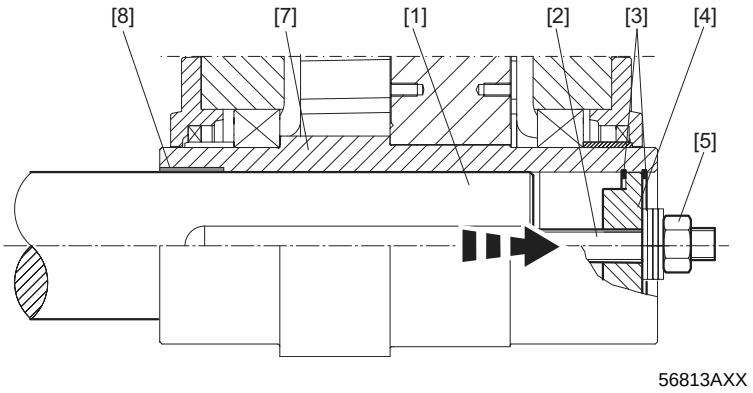
SEW-EURODRIVE recommends the following thread sizes:

Gear unit size	Thread size for • Threaded rod [2] • Nut (DIN 934) [5] • Retaining screw [6]
02 - 06	M24
07 - 09	M30

The thread size of the ejector screw depends on the end plate [4]:

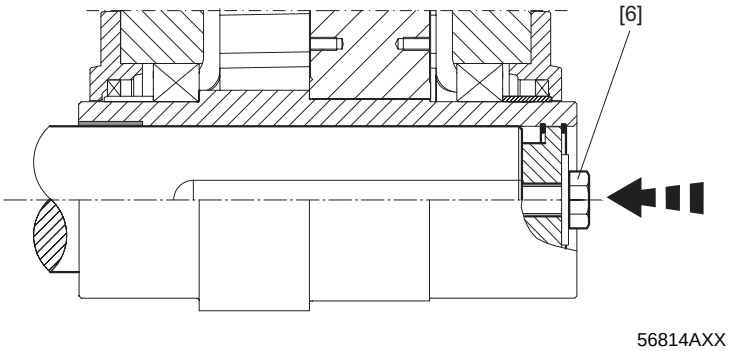
Gear unit size	Thread size of ejector screw [8]
02 - 06	M30
07 - 09	M36

Mounting the hollow shaft gear unit to the customer shaft

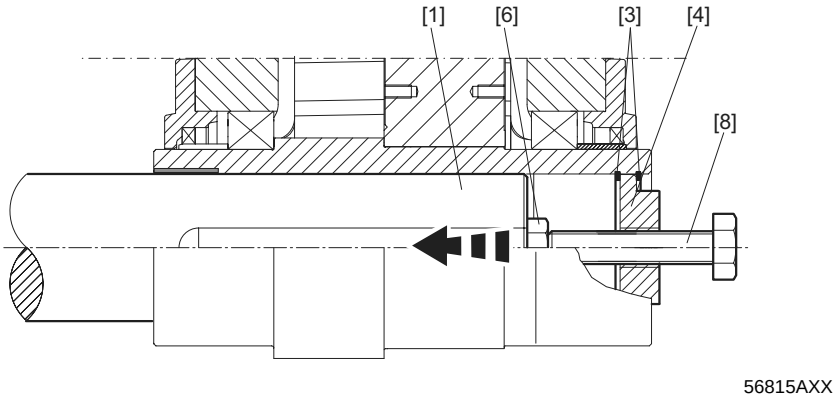


[1] Customer shaft
[2] Threaded rod
[3] Circlips
[4] End plate
[5] Nut
[7] Hollow shaft
[8] Socket

- To mount and secure the gear unit, attach the circlips [3] and the end plate [4] to the hollow shaft bore.
- Apply NOCO® fluid to the hollow shaft [7] and the shaft end of the customer shaft [1].
- Push the gear unit onto the customer shaft [1]. Screw the threaded rod [2] into the customer shaft [1]. Tighten the customer shaft [1] with the nut [5] until the shaft end of the customer shaft [1] and the end plate [4] meet.
- Loosen the nut [5] and unscrew the threaded rod [2]. After having mounted the gear unit, secure the customer shaft [1] using the retaining screw [6].



Removing the hollow shaft gear unit from the customer shaft



[1] Customer shaft
[3] Circlips
[4] End plate
[6] Retaining screw
[8] Ejector screw

- Loosen the retaining screw [6].
- Remove the outer circlip [3] and the end plate [4].
- Thread the retaining screw [6] into the customer shaft [1].
- Turn the end plate [4] and remount the end plate and the outer circlip [3].
- Screw the ejector screw [8] into the end plate [4] to remove the gear unit from the customer shaft [1].

4.7 Mounting/removing hollow shaft gear units with shrink disc

The cover cannot be mounted for special uses, such as continuous shafts. In this case, the cover can be omitted if the machine or system manufacturer delivers suitable accessories that offer the enclosure specified in DIN EN 13463.

If special maintenance work is necessary for this, it must be described in the operating instructions corresponding to the machine or components.

Only drive components with ATEX certification are permitted, assuming that these components are covered by Directive 94/9/EC.

Shrink discs serve as a connecting element between the hollow shaft of the gear unit and the customer shaft. You can find the shrink disc type used (unit designation: RLK608) in the "Determining the Type of Shrink disc" section.

- The scope of delivery includes (→ refer to the figure on page 56):
  - Circlip [3], end plate [4]
- The scope of delivery does **not** include (→ refer to the figure on pages 56 and 58):
  - Threaded rod [2], nut [5], retaining screw [6], ejector screw [8]

Select the appropriate thread and length of the threaded rod as well as the retaining screw depending on the design of the customer's machine.

Thread sizes

SEW-EURODRIVE recommends the following thread sizes:

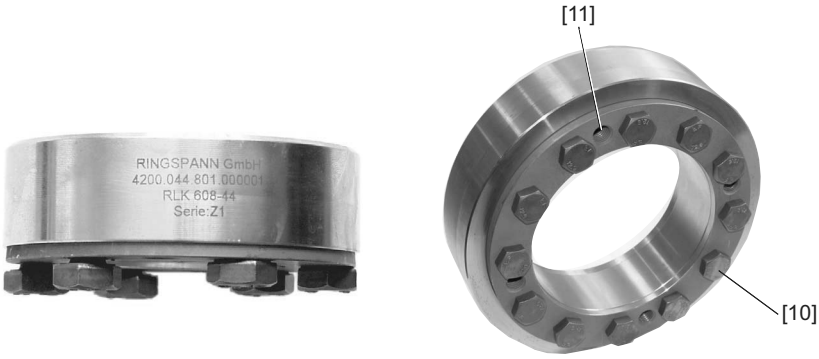
Gear unit size	Thread size for • Threaded rod [2] • Nut (DIN 934) [5] • Retaining screw [6] → see pages 56 and 58
02 - 06	M24 M30
07 - 09	

The thread size of the ejector screw depends on the end plate [4]:

Gear unit size	Thread size of the ejector screw [8]
02 - 06	M30
07 - 09	M36

Determining the type of shrink disc

The shrink disc is usually type RLK608. It is metal colored. "RLK608" is engraved on it.



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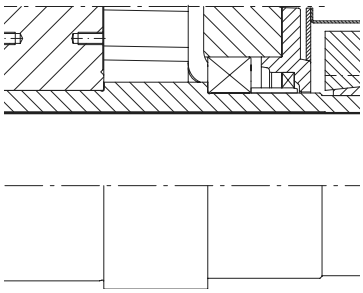
[10] Locking screw

[11] Ejector bores

Depending on the order, other types of shrink disc can be used. Read the separate operating instructions for the corresponding shrink disc.

Mounting the shrink disc

- Do not tighten the locking screws [10] before the customer shaft [1] has been mounted. This could distort the hollow shaft.



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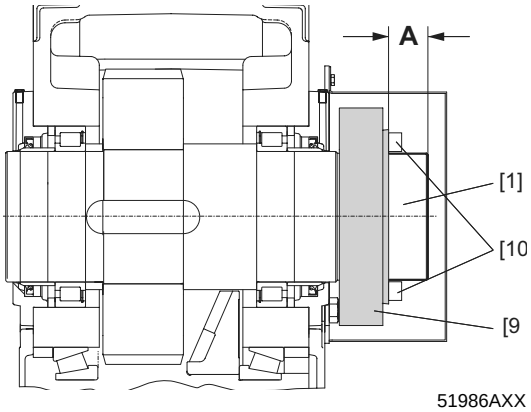
- Slide the shrink disc [9] with loosened screws onto the hub of the hollow shaft bore. Position the customer shaft [1] in the hollow shaft bore. Then move the shrink disc [9] by dimension A (→ following figure, "Dimension A" section) from the shaft end of the hollow shaft:



[1] Customer shaft
[10] Locking screws
[9] Shrink disc

Pay particular attention to the installation of the shrink disc cover.

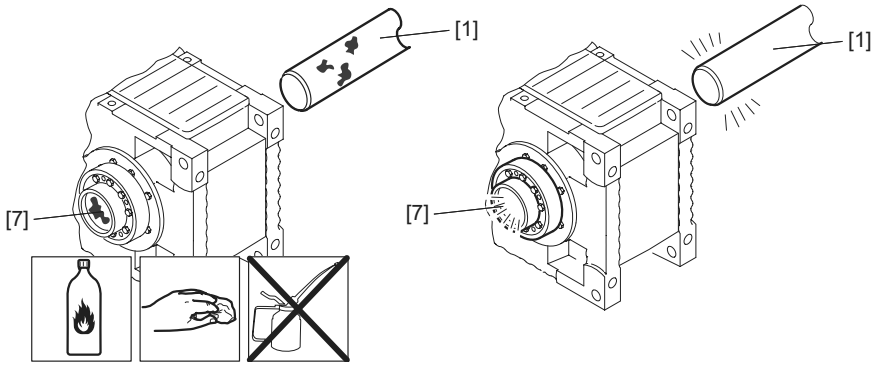
The clamping area of the shrink disc must be absolutely free of grease.

Dimension A

Gear unit size MC..	Shrink disc type RLK608 Dimension A [mm]
02	39
03	45
04	44
05	42
06	44
07	50
08	51
09	49

Mounting the hollow shaft gear unit to the customer shaft

- Before mounting the gear unit, degrease the hollow shaft bore and the customer shaft [1].



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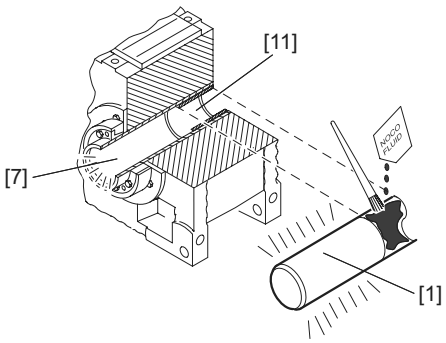
- Apply a bit of NOCO® fluid to the machine shaft in the area of the bushing [11].



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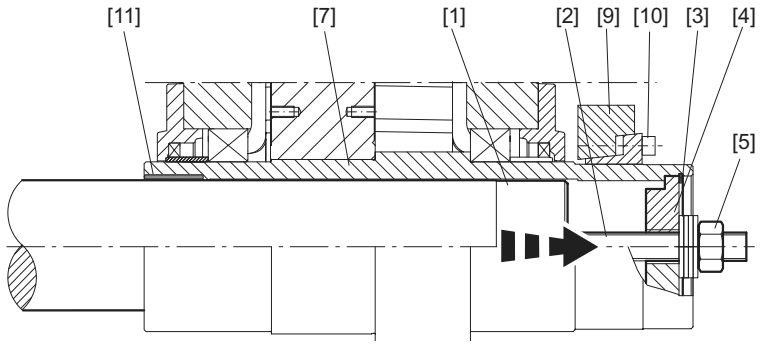
Never apply NOCO® fluid directly to the bushing since the paste may get into the clamping area of the shrink disc when the input shaft is connected.



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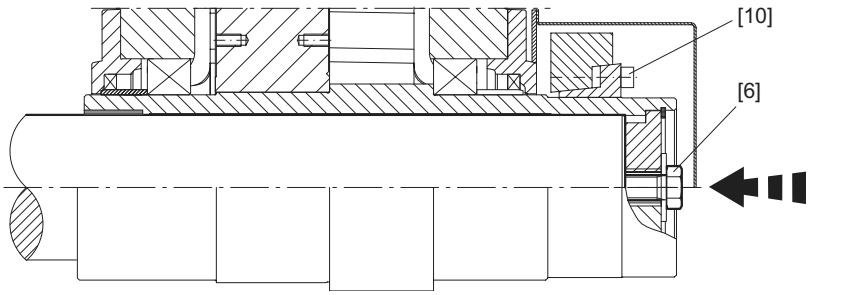
[1] Customer shaft
[2] Threaded rod
[3] Circlip
[4] End plate
[5] Nut
[7] Hollow shaft
[9] Shrink disc
[10] Locking screws
[11] Socket

- To mount and secure the gear unit, attach the circlips [3] and the end plate [4] to the hollow shaft bore.
- Push the gear unit onto the customer shaft [1]. Screw the threaded rod [2] into the customer shaft [1]. Tighten the customer shaft [1] with the nut [5] until the shaft end of the customer shaft [1] and the end plate [4] meet.
- Loosen the nut [5] and unscrew the threaded rod [2]. After mounting the gear unit, secure the customer shaft [1] using the retaining screw [6].



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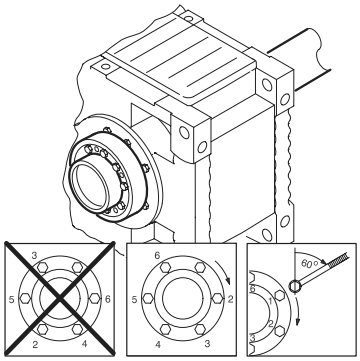
Tightening the type RLK608 shrink disc

Tighten the retaining screws by hand while the shrink disc is being aligned. Tighten the retaining screws one after the other in clockwise direction (not diagonally), each with a quarter turn.



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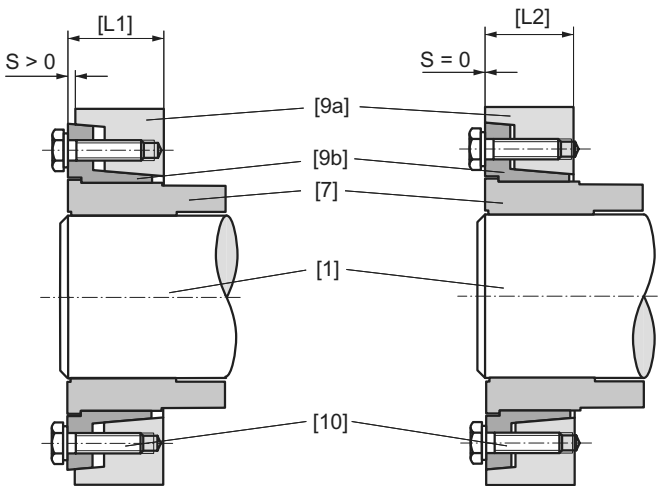
The screws of shrink discs with slotted taper bushings must be screwed on beginning with the screw on one side of the slot and continuing with the screw on the other side of the slot.

Tighten the screws by a quarter turn in several steps until the screwing surfaces of the outer and inner rings are aligned.

Mounting is determined by the axial movement of the taper bushings and can be done without a torque wrench.



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[L1] Condition at the time of shipment (preassembled)

[L2] Ready for operation (final assembly)

[9a] Bevel

[9b] Taper bushing

[7] Hollow shaft

[1] Customer shaft

[10] Locking screws

Removing the shrink disc

Loosen the locking screws [10] by a quarter turn one after the other to avoid straining the connecting surface.

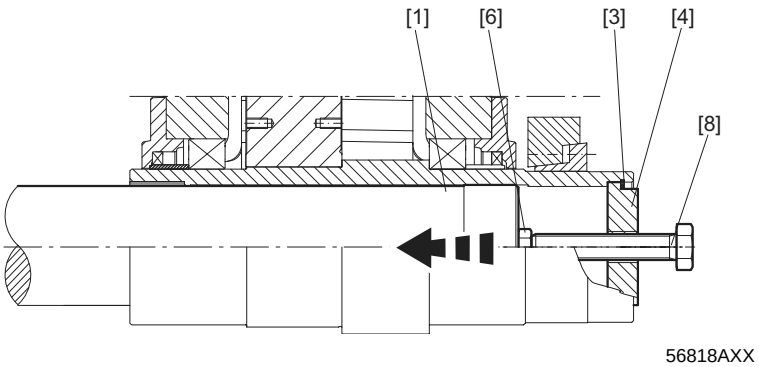
Never completely remove the locking screws since this could cause an accident.

If the taper bushing and the tapered ring do not loosen by themselves:

Take the necessary number of locking screws and screw them into the removal bores evenly. Tighten the locking screws in several steps until the tapered bushing separates from the tapered ring.

Remove the shrink disc from the hollow shaft.

Removing the hollow shaft gear unit from the customer shaft



[1] Customer shaft
[3] Circlip
[4] End plate
[6] Retaining bolt
[8] Ejector screw

- Loosen the retaining screw [6].
- Remove the outer circlip [3] and the end plate [4].
- Thread the retaining screw [6] into the customer shaft [1].
- Turn the end plate [4] and remount the end plate and the outer circlip [3].
- Screw the ejector screw [8] into the end plate [4] to remove the gear unit from the customer shaft [1].

Cleaning and lubrication

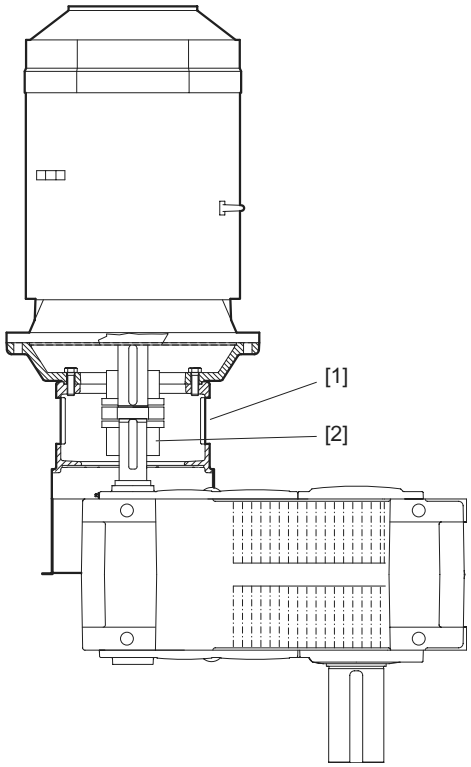
Clean the shrink disc after removal and

- lubricate locking screw [10] on the threading and under the head with an MoS_2 compound, "gleitmo 100" from FUCHS LUBRITECH (www.fuchs.-lubritech.de) for example.
- Lubricate the tapered surfaces and the screwing surfaces of the tapered bushing with a thin layer (0.01 - 0.02 mm) using "gleitmo 900" lubricant from FUCHS LUBRITECH (www.fuchs.-lubritech.de) or a comparable product from another manufacturer.

Spray on the lubricant until the layer is thick enough to cover the surface (in this case, approx. 0.02 mm thick).

4.8 Mounting a motor with motor adapter

Motor adapters [1] are available for connecting IEC motors of sizes 132 to 315 to MC series industrial gear units.



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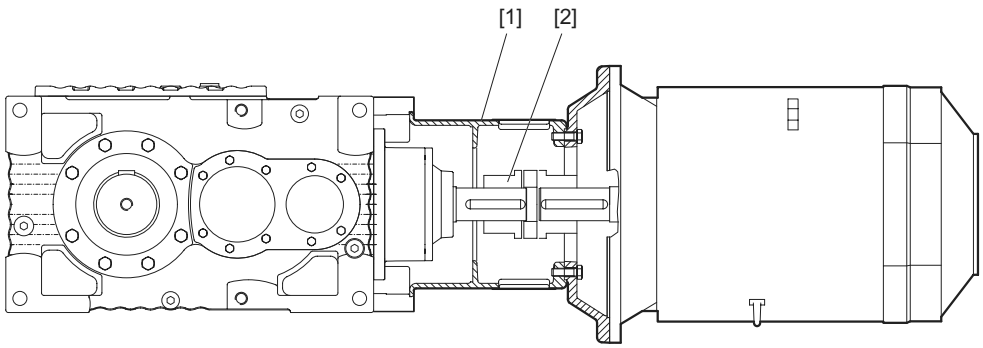
[1] Motor adapter

[2] Coupling



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[1] Motor adapter

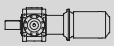
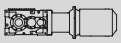
[2] Coupling

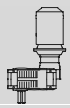
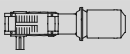
For installing couplings [2], refer to the notes in the "Mounting couplings" section.

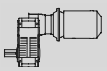
When selecting a motor, take the permitted **motor weight**, the **gear unit mounting position**, and the **type of gear unit mounting** into account according to the following tables.

The following applies to all tables:

G_M = Motor weight G_G = Gear unit weight

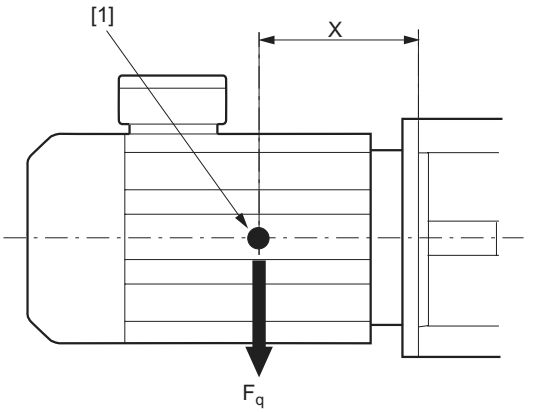
Type of Mounting	Industrial Gear Unit Series	
	 **MC.PL..**	 **MC.RL..**
Foot mounting	$G_M \leq G_G$	$G_M \leq G_G$
Shaft mounted design	$G_M \leq 0.5G_G$	$G_M \leq G_G$
Flange mounting	$G_M \leq 0.5G_G$	$G_M \leq G_G$

Type of Mounting	Industrial Gear Unit Series	
	 **MC.PV..**	 **MC.RV..**
Foot mounting	$G_M \leq 1.5G_G$	$G_M \leq G_G$
Shaft mounted design	$G_M \leq G_G$	$G_M \leq G_G$
Flange mounting	$G_M \leq G_G$	$G_M \leq 0.75G_G$

Type of Mounting	Industrial Gear Unit Series	
	 **MC.PE..**	**MC.RE..**
Foot mounting	G_M G_G	G_M $1.5G_G$
Shaft mounted design	G_M G_G	G_M G_G
Flange mounting	G_M G_G	G_M G_G

These tables are for stationary operation only. Contact SEW-EURODRIVE if the gear unit moves while in operation (e.g. travel drive).

These tables apply only to the following assignment of motor size/weight Fq and dimension "x."



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[1] Center of gravity of the motor

Motor size		F_q	x
IEC	NEMA	[N]	[mm]
132S	**213/215**	579	189
132M	**213/215**	677	208
160M	**254/286**	1.059	235
160L	**254/286**	1.275	281
180M	**254/286**	1.619	305
180L	**254/286**	1.766	305
200L	**324**	2.354	333
225S	**365**	2.943	348
225M	**365**	3.237	348
250M	**405**	4.267	395
280S	**444**	5.984	433
280M	**445**	6.475	433
315S	**505**	8.142	485
315M	**505**	8.927	485
315L		11.772	555

The maximum permitted weight of attached motor F_q has to be reduced linearly if the center of gravity distance x is increased. $F_{q\ max}$ cannot be increased if the center of gravity distance is reduced.

Please contact SEW-EURODRIVE in the following cases.

- When retrofitting motor adapters with a cooling air fan (not for motors of sizes 132S and 132M).
- After the motor adapter is removed, the gear unit must be re-aligned.

4.9 Installing industrial gear units in potentially explosive areas

Observe the safety notes listed in section 2 when installing a gear unit in a potentially explosive area.

4.10 Gear units in category II2GD

- **Explosion-proof MC.. series gear units comply with the design requirements for group II, categories 2G or 3G (potentially explosive gas atmosphere) and 2D or 3D (potentially explosive dust atmosphere). These gear units are intended for use in zones 1 and 21 or zones 2 and 22.**

Ambient temperature

Gear units in category II2GD or II3GD may be operated at ambient temperatures from -20 °C to +40 °C only.

Any ambient temperatures deviating from this range have to be listed on the nameplate.

Temperature class

Mains-operated gear units in categories II2G and II3G (potentially explosive gas atmosphere) are approved for temperature classes T3 to T6 depending on their speed, reduction ratio, and mounting position. The category and temperature class of the gear unit are on the nameplate.

Surface temperature

The maximum surface temperature of gear units in categories II2D and II3D is either 120 °C or 140 °C, depending on their speed, reduction ratio, and mounting position. Lower surface temperatures are only permitted after consultation with SEW-EURODRIVE. The category and maximum surface temperature must be on the nameplate. The system operator must ensure that dust accumulation does not exceed an upper limit of 5 mm in accordance with EN50281-1-2.

Degree of protection

The degree of protection is specified on the nameplate as an IP number.

Environmental conditions

Take measures to ensure that the gear units are sufficiently ventilated and that they are not heated by an external heat source (e.g. the coupling).

Output power and output torque

Output torque, speeds, and permitted radial and axial forces must be in accordance with the specifications on the nameplate.

5 Mechanical Installation Options

5.1 Important installation instructions

Before starting work on couplings, disconnect the motor from its supply and prevent it from being switched on again.

Do not use spacers to make installation easier.

Important installation instructions

- Use a mounting device only for installing input and output elements. Use the center bore and the thread on the shaft end for positioning.
- **Never drive couplings, pinions, etc. onto the shaft end by hitting them with a hammer (damage to bearings, housing and the shaft).**
- **In the case of belt pulleys, make sure the belt has the correct tension (in accordance with the manufacturer's instructions).**
- **Use belts with sufficient electrical shunt resistance < 10^9 Ω.**
- The requirements of IEC 60695-11-10, category FV-0 must be met.
- Power transmission elements should be balanced after fitting and may not give rise to radial or axial forces that are not permitted.

Note:

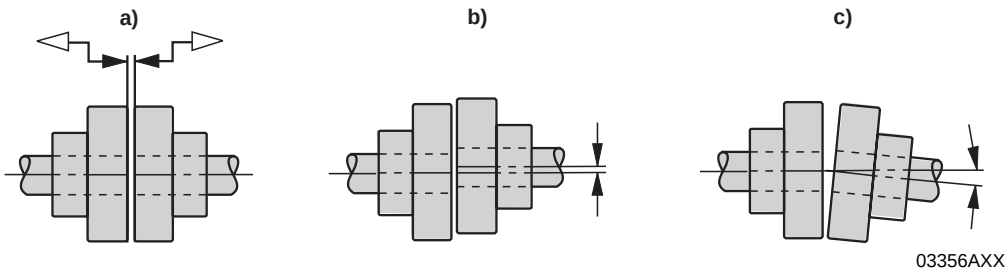
Mounting is easier if you first apply lubricant to the output element or heat it up briefly (to 80 - 100 °C).

Adjust the following when mounting couplings:

a) Axial misalignment (maximum and minimum distances)

b) Offset (concentricity error)

c) Angular offset

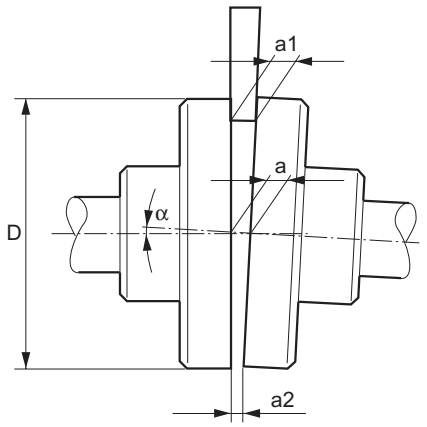


Input and output elements such as couplings must be covered with a touch guard.

The following methods for measuring angular offset and axial misalignment are important for complying with the mounting tolerances specified in the "Mounting Couplings" section.

Measuring angular offset with a feeler gauge

The following figure shows the measurement of angular offset (α) using a feeler gauge. This method only achieves an accurate result when the deviation of the coupling faces is eliminated by turning both coupling halves by 180 and then calculating the average value from the difference ($a_1 - a_2$).



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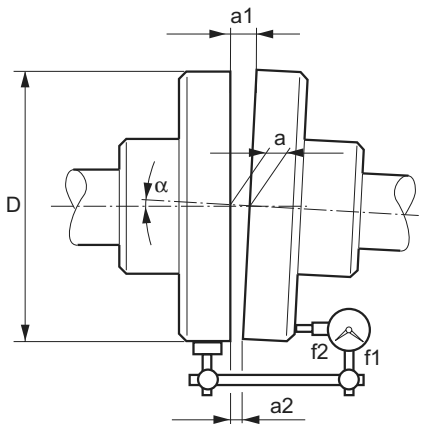
Measuring angular offset using a micrometer dial

The following figure shows measurement for angular offset using a micrometer dial. This measuring method yields the same result as described in the "Measuring Angular Offset with a Feeler Gauge" section if the **coupling halves are rotated together** (e.g. with a coupling pin), so that the needle of the micrometer dial does not perceptibly move on the measuring surface.



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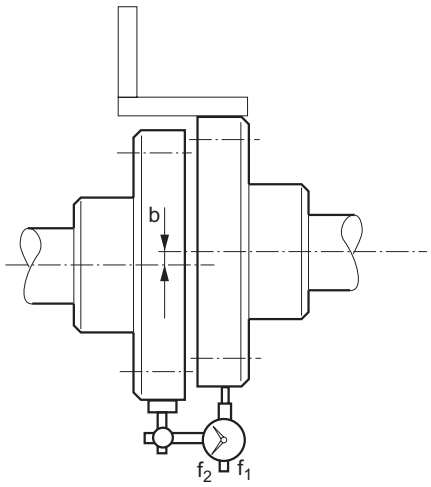
A prerequisite for this measuring method is that no axial play is in the shaft bearings when the shafts rotate. If this condition is not fulfilled, the axial play between the faces of the coupling halves must be eliminated. As an alternative, you can use two micrometer dials positioned on the opposite sides of the coupling (to calculate the difference of the two micrometer dials when rotating the coupling).

Measuring offset using a straight edge and a micrometer dial

The following figure shows the measurement for offset using a straight edge. Permissible values for offset are usually so small that the best measurement results can be achieved with a micrometer dial. **If you rotate one coupling half** together with the micrometer dial and divide the deviation by two, the deviation displayed on the micrometer dial indicates the misalignment (dimension "b") that includes the offset of the other coupling half.



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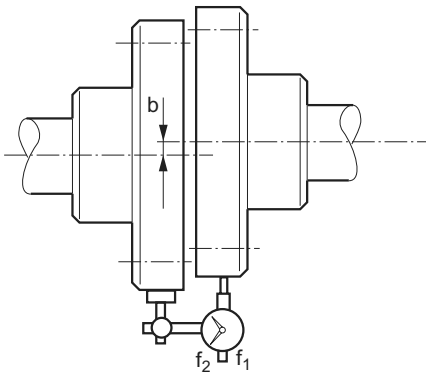
Measuring offset using a micrometer dial

The following figure shows the how to measure using a **more accurate measuring method**. The **coupling halves are rotated together** without letting the needle of the micrometer dial slide onto the measuring surface. Offset is obtained by dividing the deviation displayed on the micrometer dial (dimension "b").



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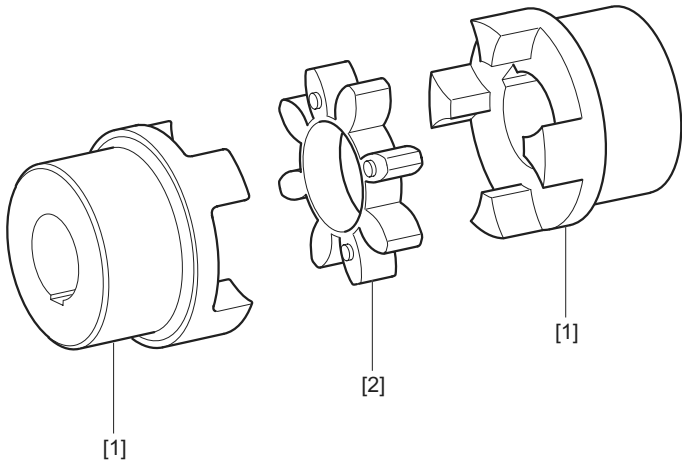
5.2 Mounting couplings

ROTEX Coupling



[1] Coupling hub

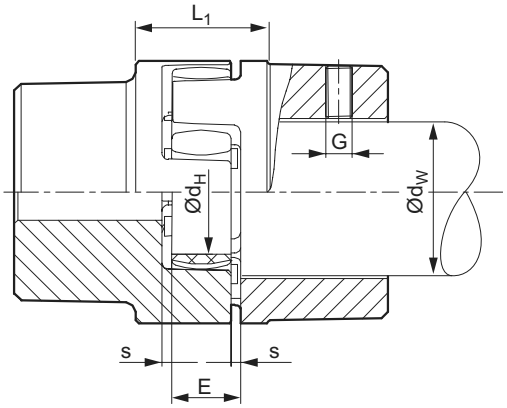
[2] Annular gear

The low-maintenance, elastic ROTEX coupling is capable of compensating for radial and angular offsets. Careful and exact alignment of the shaft ensures a long service life for the coupling.

Couplings must be identified for use in potentially explosive atmospheres.

Note the special operating instruction for ROTEX couplings.

Mounting the coupling halves onto the shaft



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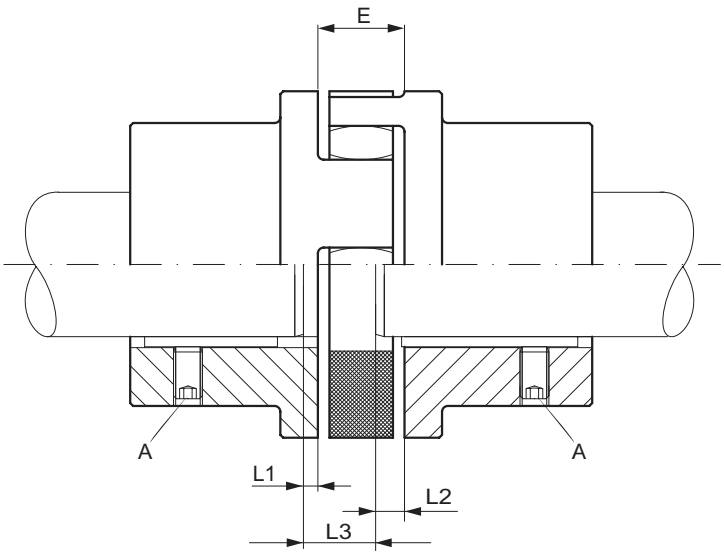
Coupling Size	Mounting Dimensions						Locking Screw	
	E [mm]	s [mm]	d_H [mm]	d_W [mm]	L_1 (Alu / GC / GCI) [mm]	L_1 (steel) [mm]	G	Tightening torque [Nm]
14	13	1.5	10	7	-	-	M4	2.4
19	16	2	18	12	26	-	M5	4.8
24	18	2	27	20	30	-	M5	4.8
28	20	2.5	30	22	34	-	M6	8.3
38	24	3	38	28	40	60	M8	20
42	26	3	46	36	46	70	M8	20
48	28	3.5	51	40	50	76	M8	20
55	30	4	60	48	56	86	M10	40
65	35	4.5	68	55	63	91	M10	40
75	40	5	80	65	72	104	M10	40
90	45	5.5	100	80	83	121	M12	69
100	50	6	113	95	92	-	M12	69
110	55	6.5	127	100	103	-	M16	195
125	60	7	147	120	116	-	M16	195
140	65	7.5	165	135	127	-	M20	201
160	75	9	190	160	145	-	M20	201
180	85	10.5	220	185	163	-	M20	201

The shaft distance (dimension E) must be strictly observed so that the axial play of the coupling is ensured.

Mounting dimensions of ROTEX coupling in motor adapter

Tighten the setscrews (A) to prevent axial play of the coupling.



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The mounting dimensions listed in the following table apply only to mounting a ROTEX coupling in a motor adapter. They apply to all gear unit versions and gear ratios.

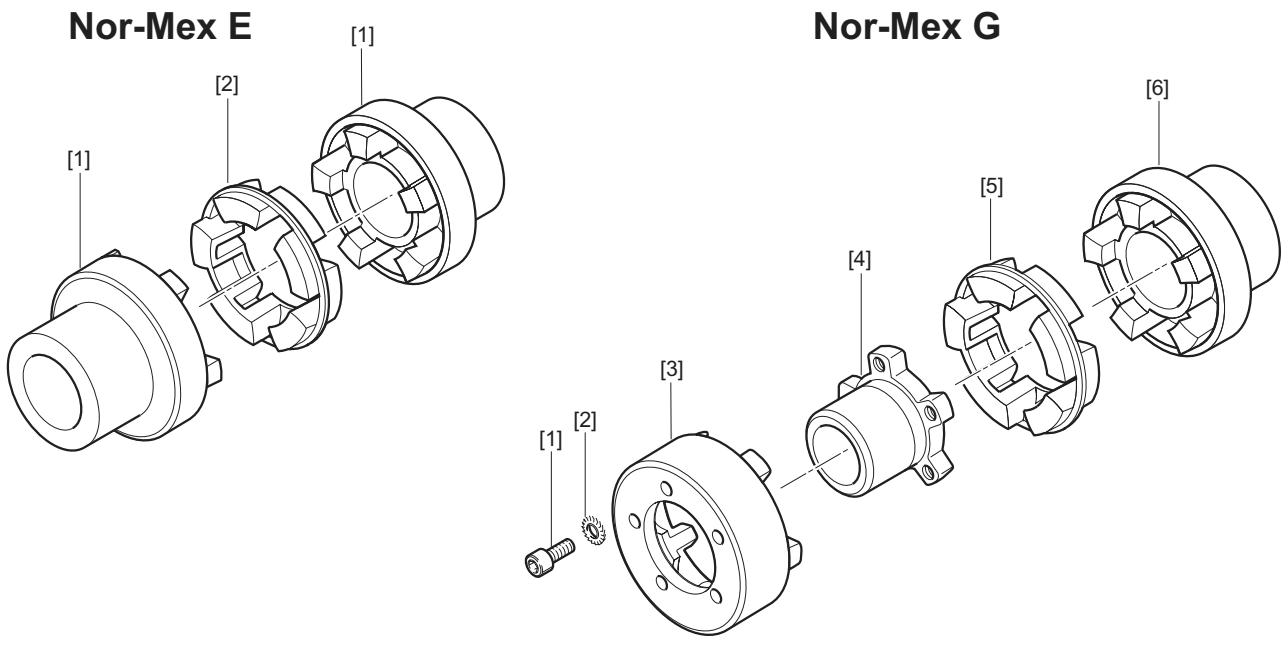
ROTEX Coupling Size	IEC Motor Size	Mounting Dimensions			
		E [mm]	L_1 [mm]	L_2 [mm]	L_3 [mm]
R28/38	**132**	20	0	–17	3
R38/45	**160**	24	1	0	25
R42/55	**180/200**	26	–1	0	25
R48/60	**225**	28	0	–3	25
R55/70	**225**	30	0	–5	25
R65/75	**250/280**	35	0	–10	25
R75/90	**315**	40	0	–15	25
R90/100	**315**	45	–20	0	25

STOP

The shaft distance (dimension E) must be strictly observed to ensure axial play of the coupling.

Nor-Mex coupling for types G and E

The low-maintenance Nor-Mex couplings for types G and E are torsionally flexible couplings capable of compensating for axial misalignment and angular and radial offset. Torque is transmitted via an elastic spacer bush with high damping properties that is also oil and heat resistant. The couplings can be used for either direction of rotation and can be mounted in any position. The design of the Nor-Mex G type coupling allows the elastic element [5] to be replaced without shaft offset.



[1] Coupling hub
[2] Elastic spacer bush

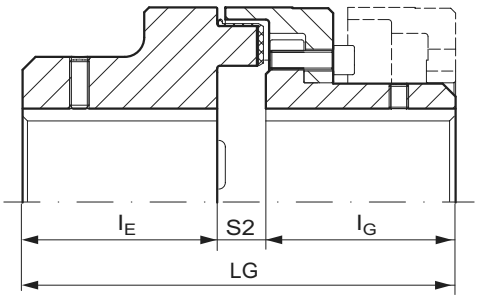
[1] Socket head screw
[2] Washer
[3] Claw ring
[4] Flange hub
[5] Elastic spacer bush
[6] Coupling hub

Couplings must be identified for use in potentially explosive atmospheres.

Note the special operating instruction for Nor-Mex E or Nor-Mex G couplings.

Mounting instructions, mounting dimensions for Nor-Mex G couplings

After mounting the coupling halves, ensure that the recommended play (dimension S_2 for G type, dimension S_1 for E type) and the overall length (dimension L_G for G type and dimension L_E for E type) correspond with the dimensions given in the following tables. Accurate alignment of the coupling (→ "Mounting Tolerances") ensures a long service life.



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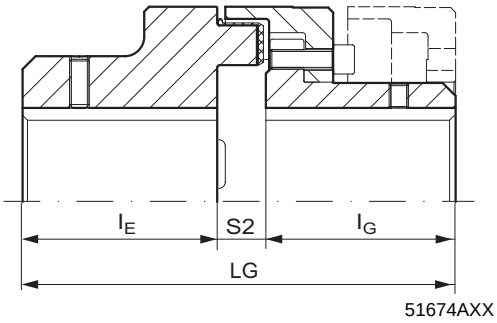
Nor-Mex G Coupling Size	Mounting Dimensions				Weight [kg]
	l_E [mm]	l_G [mm]	L_G [mm]	Perm. deviation S_2 [mm]	
82	40	40	92	12±1	1.85
97	50	49	113	14±1	3.8
112	60	58	133	15±1	5
128	70	68	154	16±1	7.9
148	80	78	176	18±1	12.3
168	90	87	198	21±1.5	18.3
194	100	97	221	24±1.5	26.7
214	110	107	243	26±2	35.5
240	120	117	267	30±2	45.6
265	140	137	310	33±2.5	65.7
295	150	147	334	37±2.5	83.9
330	160	156	356	40±2.5	125.5
370	180	176	399	43±2.5	177.2
415	200	196	441	45±2.5	249.2
480	220	220	485	45±2.5	352.9
575	240	240	525	45±2.5	517.2

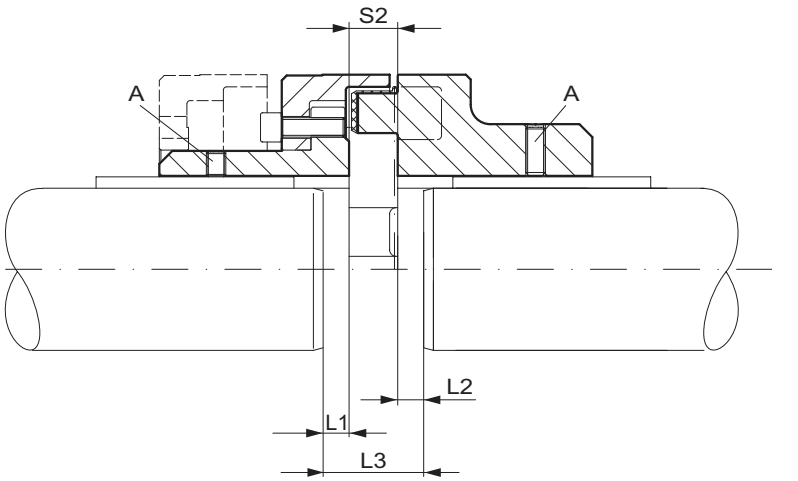
Mounting dimensions of Nor-Mex E couplings



Nor-Mex E Coupling Size	Mounting Dimensions			
	l_E [mm]	LE [mm]	Perm. deviation S_1 [mm]	Weight [kg]
67	30	62.5	2.5± 0.5	0.93
82	40	83	3± 1	1.76
97	50	103	3± 1	3.46
112	60	123.5	3.5± 1	5
128	70	143.5	3.5± 1	7.9
148	80	163.5	3.5± 1.5	12.3
168	90	183.5	3.5± 1.5	18.4
194	100	203.5	3.5± 1.5	26.3
214	110	224	4± 2	35.7
240	120	244	4± 2	46.7
265	140	285.5	5.5± 2.5	66.3
295	150	308	8± 2.5	84.8
330	160	328	8± 2.5	121.3
370	180	368	8± 2.5	169.5
415	200	408	8± 2.5	237
480	220	448	8± 2.5	320
575	240	488	8± 2.5	457

Mounting dimensions of the Nor-Mex G coupling in the motor adapter

Tighten the setscrews (A) to prevent axial play of the coupling.



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The mounting dimensions listed in the following table apply only to mounting a Nor-Mex coupling in a motor adapter.

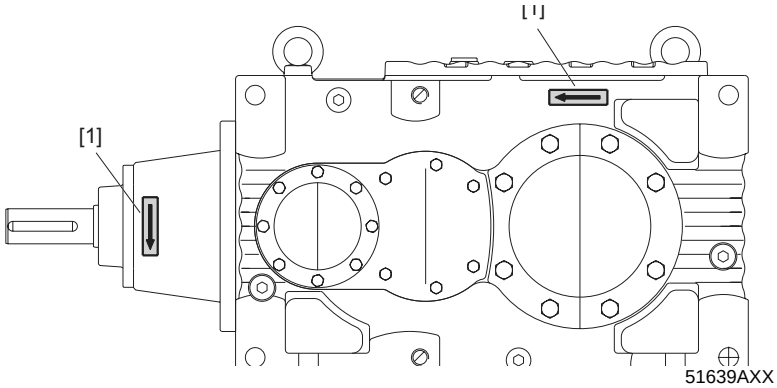
NOR-MEX G.. Coupling Size		97	97	112	128	148	168	194	214
	IEC Motor Size	132	160	160/180	200	225	250/280	280/315	315
Gear unit size Gear ratio i	Mounting dimensions	[mm]							
All All	S_2	14	14	15	16	18	21	24	26
	L_3	3	25	25	25	25	25	25	25
MC3R02 i = 14 to 63	L_2	-	5	5	5	10	2	1	0
	L_1	-	6	5	4	–3	2	0	–1
MC3R05 i = 14 to 63	L_2	-	5	5	5	4	2	5	0
	L_1	-	6	5	4	3	2	–4	–1
MC3R08 i = 14 to 63	L_2	-	5	5	5	4	2	1	5
	L_1	-	6	5	4	3	2	1	–6
Other MC.. I = 7.1 to 112	L_2	–5	5	5	5	4	2	1	0
	L_1	–6	6	5	4	3	2	0	–1

5.3 FXM Backstop

Backstops prevent undesirable reverse rotation. During operation, rotation in one specified direction of rotation only is permitted.

- **The motor may not be started in the blocking direction. Make sure that the current supply to the motor is correct in order to achieve the required direction of rotation. Operating the motor in the blocking direction could destroy the backstop.**
- **Before changing the blocking direction, contact SEW-EURODRIVE.**

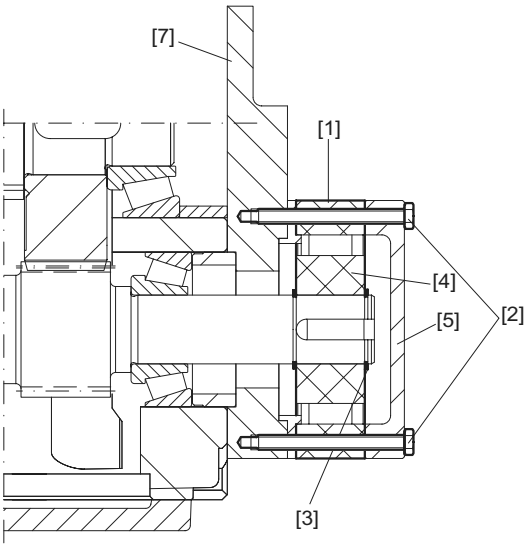
The maintenance-free FXM type backstop is a centrifugally operated backstop with sprags that lift off. Once the lift-off speed is reached, the sprags lift off from the contact surface of the outer ring completely. The backstop is lubricated with gear oil. An arrow on the gear unit housing indicates the permitted direction of rotation [1] (→ following figure).



Changing the direction of rotation

To change the direction of rotation, turn the inner ring with the sprags 180°. Pull out the inner ring with the sprags using a pulling device (not included in the scope of delivery), turn it 180° and then replace it.

...for a backstop mounted outside the gear unit



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[1] Outer ring
[2] Retaining screws
[3] Circlip
[4] Inner ring with cage and sprags
[5] Backstop cover
[6] Centering disk
[7] Gear unit bearing cover

1. Drain the oil from the gear unit (→ "Inspection and Maintenance" section).
2. Loosen the retaining screws [2] of the backstop.
3. Remove the outer ring [1]. To facilitate removal, slightly turn the outer ring [1] in free-wheeling direction.
4. Remove the circlip [3], and inner ring with cage and sprags [4].
5. Turn the inner ring [4] with the sprags 180° and clean all of the contact surfaces between the
   - gear unit cover [7] and centering disk [6]
   - centering disk [6] and outer ring [1]
   - outer ring [1] and backstop cover [5]

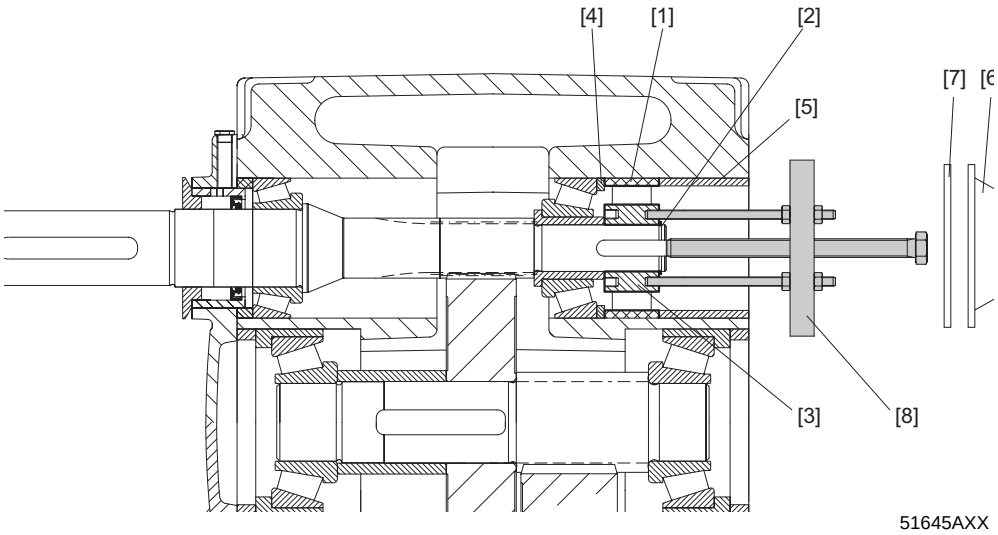
   and renew the sealing in the contact surfaces using a suitable sealing compound before re-mounting.
6. Install the parts again in reverse order. The force applied during installation should be channeled to the inner ring [4] and not to the cage with the wedge elements. Use the threaded holes on the inner ring [4] for mounting.

7. Secure the inner ring [4] with the circlip [3] in the axial direction. Mount the outer ring [1] using the retaining screws [2]. Observe the tightening torques specified in the following table:

Screw Size	Tightening Torque [Nm]
M5	6
M6	10
M8	25
M10	48
M12	84
M16	206
M20	402
M24	696
M30	1420

8. Change the direction arrow on the gear unit housing.
9. Refill the gear unit with oil (→ section 10). Check the oil level.
10. After mounting, check whether the backstop is running smoothly.

... with the backstop installed in the gear unit



[1] Outer ring
[2] Circlip
[3] Inner ring with cage and wedge elements
[4] Supporting ring
[5] Sleeve
[6] Bearing cover
[7] Shims
[8] Pulling device
[9] Gear unit housing

1. Drain the oil from the gear unit (→ "Inspection and Maintenance" section).
2. Remove the bearing cover [6], shims [7] and sleeve [5]. Make sure that you do not confuse the shims [7] and sleeve [5] with the bearing cover [6] and outer ring [1]. They must be re-installed in the correct order.
3. Remove the circlip [2] from the input shaft.
4. Remove the inner ring with the cage and wedge elements [3] using a suitable pulling device [8]. Use the threaded holes on the inner ring [3] for mounting.
5. Turn the inner ring [3] with the wedge elements 180° and clean all of the contact surfaces between the bearing cover [6] and the gear unit housing [9].
6. Install the parts again in reverse order. Use a suitable sealing compound to seal the contact surfaces between the bearing cover [6] and the gear unit housing [9]. The force applied during installation should be channeled to the inner ring [3] and not to the cage with the wedge elements.
7. When mounting the backstop, turn it in the freewheeling direction so that the clamping elements move into the outer ring.
8. Secure the inner ring [3] with the circlip [2] in the axial direction.
9. Mount sleeve [5], shims [7] and bearing cover [6] in reverse order.
10. Change the direction arrow on the gear unit housing.
11. Refill the gear unit with oil (→ "Lubricants" section). Check the oil level.
12. After mounting, check whether the backstop is running smoothly.

5.4 SHP shaft end pump

Use

The maintenance-free SHP shaft end pump is the preferred solution for gear unit sizes 04 to 09 for pressure lubrication (→ section 10 "Design and Operating Notes").

The maintenance-free SHP.. shaft end pump can be used to lubricate gear unit parts of size 04 to 09 gear units that are not submerged in the oil bath. The shaft end pump can be operated in both directions of rotation.

A minimum input speed is required for the shaft end pump to function properly. If you use variable input speeds (e.g. inverter-controlled drives) or want to change the speed range of a gear unit with a shaft end pump that has already been delivered, it is essential that you contact SEW-EURODRIVE.

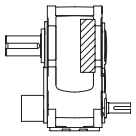
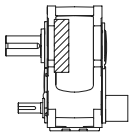
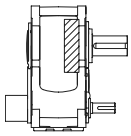
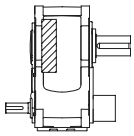
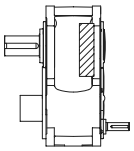
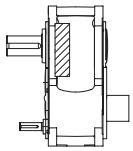
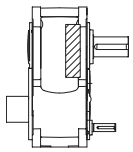
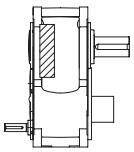
Pump position

The pump is mounted on the gear unit externally and is driven directly by the input shaft or the intermediate shaft of the gear unit. This ensures that the pump functions reliably. The pump position depends on the following factors:

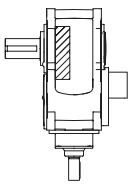
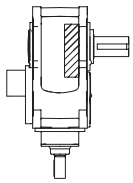
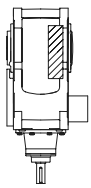
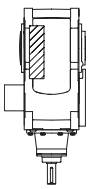
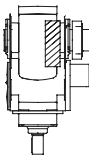
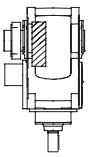
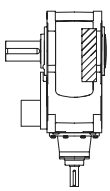
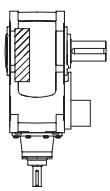
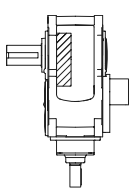
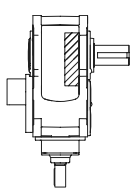
- Number of gear stages
- Type of gear unit (helical or helical-bevel gear unit)
- Shaft position of the gear unit
- Type of output shaft

Check that the shaft end pump does not collide with other structures.

The following tables display the positions of the pumps:

	Shaft Positions			
	23	**13**[1)]	**24**[1)]	**14**
MC2P • Solid shaft • Hollow shaft with keyway • Hollow shaft with shrink disc				
MC3P • Solid shaft • Hollow shaft with keyway • Hollow shaft with shrink disc				

1) The maximum permitted external forces on the output shaft are lower.

	Shaft Positions			
	03	**04**	**03**[1)]	**04**[1)]
MC2R • Solid shaft				
MC2R • Hollow shaft with keyway				
MC2R • Hollow shaft with shrink disc				
MC3R • Solid shaft • Hollow shaft with keyway • Hollow shaft with shrink disc				

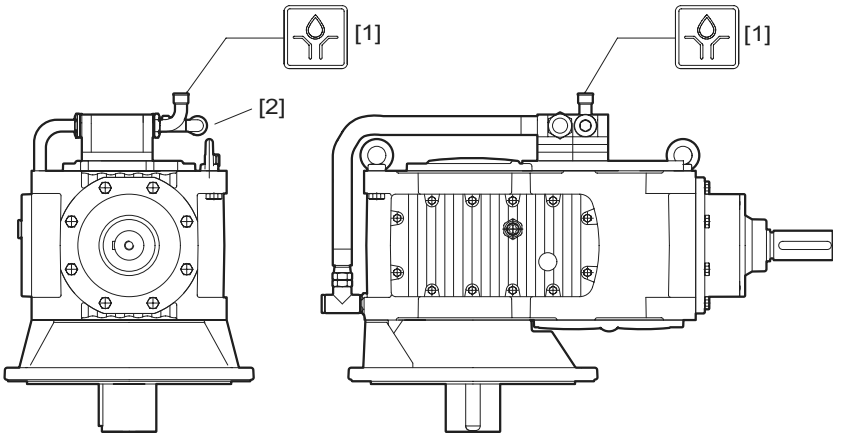
1) The maximum permitted external forces on the output shaft are lower.

Pump suction

- **Note that the gear unit must be sufficiently lubricated from the very beginning.**
- **Do not change the diameter of the tube / pipe connection.**
- **Do not open the pressure line [PRE].**
- **If the shaft end pump does not build up pressure within 10 seconds after the gear unit has been started, contact SEW-EURODRIVE.**

Shaft end pump mounted on top of the MC.V.. gear unit

Dry starting can occur when the shaft pump end is mounted on top of the gear unit.



[1] Separate oil filling plug on the intake pipe

[2] Oil flow monitor or optical oil flow indicator (not visible in the figure)

It is essential for the oil pump to begin pumping as soon as the main motor begins to turn. If it does not, open the separate oil filling plug [1] and add some oil (1 - 4 liters). Close the separate oil filling plug as soon as the oil starts circulating (check using the oil flow monitor or optical oil flow indicator [2]).

This procedure is especially important if the gear unit has not been used for a long time and there is air in the suction line and oil pump.

5.5 Installation with steel frame

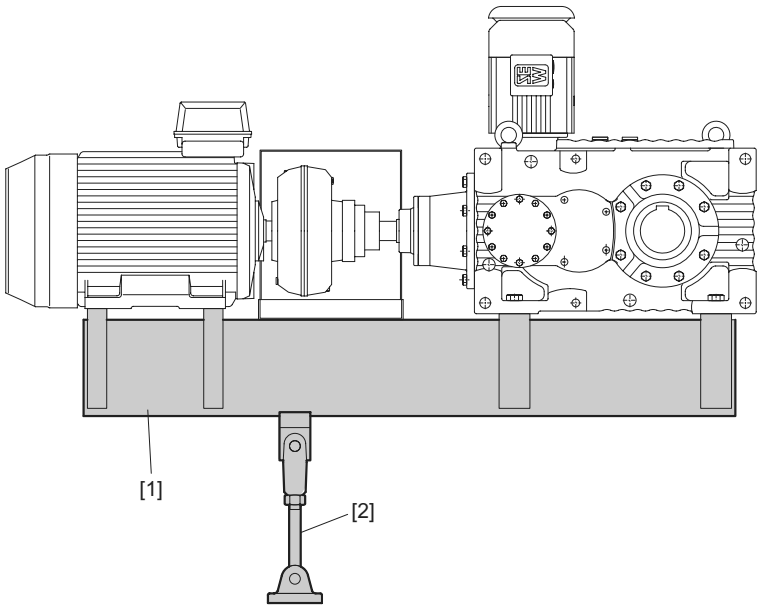
For MC.. series industrial gear units in the horizontal mounting position (MC2P**L**.., MC3P**L**.., MC2R**L**.., and MC3R**L**..), SEW-EURODRIVE supplies preassembled drive packages on a steel frame (swing base or base plate).

Swing base

A swing base is a steel frame [1] that accommodates the gear unit, (hydro) coupling, and motor (and brake, if required). This normally refers to

- Hollow shaft gear unit or
- Solid shaft gear unit with a fixed flange coupling on the output shaft

The steel construction [1] is supported by a torque arm [2] (→ section 5.6 "Torque Arm").



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[1] Swing base

[2] Torque arm

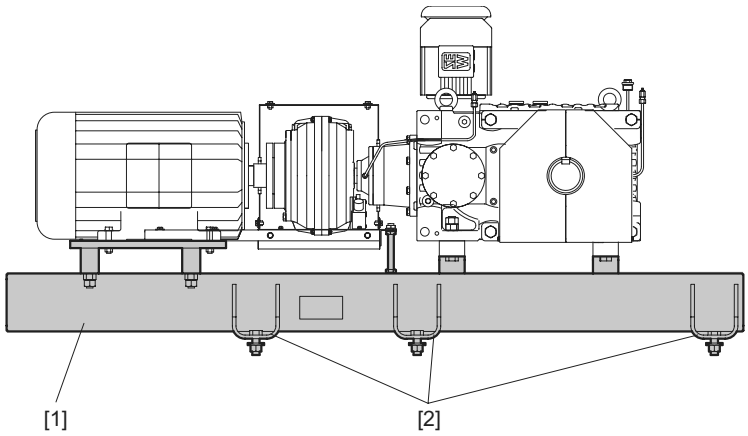
Make sure that the

- **System is dimensioned to enable the torque of the torque arm to be absorbed (→ "Gear Unit Foundation" section 4.4).**
- **Swing base is not distorted during installation (possible damage to gear unit and coupling)**

If the gear unit moves to the side during operation or there is a noticeably large number of peak torques, you should not use a fixed torque arm. Use a torque arm with flexible bearing bushing instead. Contact SEW-EURODRIVE.

Base plate

A base frame is a steel frame [1] that accommodates the gear unit, (hydro) coupling, and motor (and brake, if required). The steel frame is supported by several foot mountings [2]. This frame is usually used for solid shaft gear units with elastic coupling on the output shaft.



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[1] Base plate

[2] Foot mounting

Make sure that the

- **support structure of the foot mounting is adequately dimensioned (→ "Gear Unit Foundation" section 4.4).**
- **base plate is not distorted due to incorrect alignment (possible damage to gear unit and coupling).**

Observe the special installation instructions for the swing base or the base plate.

5.6 Torque arm

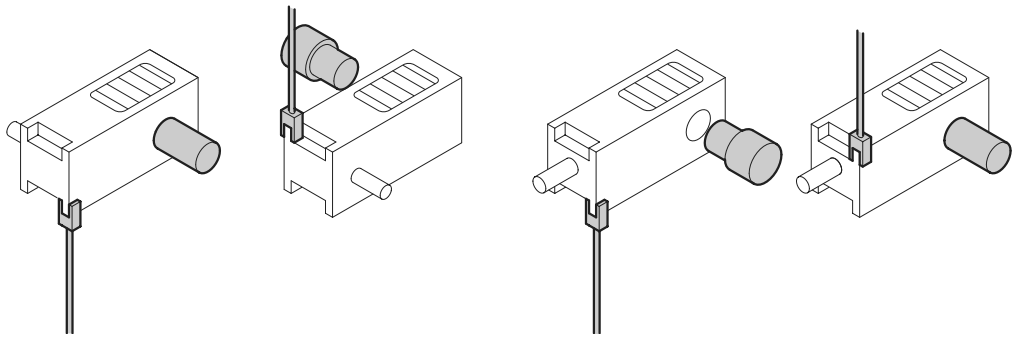
If the gear unit moves to the side during operation or there is a noticeably large number of peak torques, you should not use the fixed torque arm. Use a torque arm with flexible bearing bushing instead. Please contact SEW-EURODRIVE.

Mounting options

An optional torque arm to be mounted directly to the gear unit or to the swing base can be supplied.

Mounted directly to the gear unit

Always mount the torque arm on the side of the driven machine.



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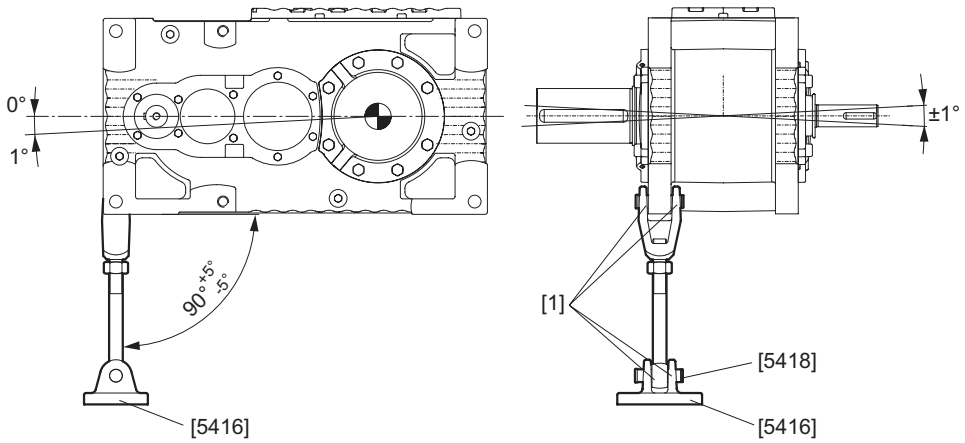
The torque arm can be directly mounted to the gear unit in the case of tensile load and thrust load. Additional tensile or thrust load may be caused by:

- Deviations in concentricity during operation
- Thermal expansion of the driven machine

To avoid such strain, the anchor bolt [5418] is equipped with double connection elements that allow sufficient lateral and radial play [1].



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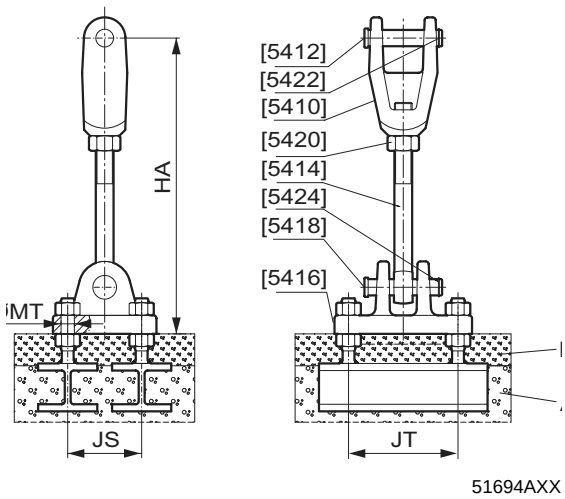
It is essential to have sufficient play [1] between the torque arm and retaining plate [5416] as well as between the torque arm and gear unit. This way, no bending force can act on the torque arm and the bearings of the output shaft are not subjected to any additional load.

Foundation for torque arm

To build the foundation for the directly mounted torque arm or the torque arm mounted to the swing base of the motor, proceed as follows:

- Place the supporting girders horizontally in their previously measured locations. Anchor the supporting girders in the concrete base [A].
- Reinforce the concrete base [A] and connect it to the base using steel rods. The concrete base [A] must withstand at least the same load as the weld joints of the foundation screws.
- After having mounted the torque arm, position the grouting [B] and bond it to the concrete base [A] with steel rods.



[A] Concrete base
[B] Grouting
[5410] Anchoring
[5412] Anchoring bolt
[5414] Eye bolt
[5416] Anchor plate
[5418] Anchoring bolt
[5420] Hexagonal nut
[5422] Retaining ring
[5424] Retaining ring

All parts listed except items A and B are included in the scope of delivery.

Length HA of the torque arm (→ table below) can be selected as required within the range from HA_{min} to HA_{max}. If you require an HA that is longer than HA_{max}, the torque arm will be supplied as a special version.

Gear unit size	HA [mm] min. ... max.	JT [mm]	JS [mm]	∅MT [mm]
02, 03	360 to 410	148	100	18
04, 05	405 to 455			
06, 07	417 to 467			
08, 09	432 to 482	188	130	22

5.7 Mounting a V-belt drive

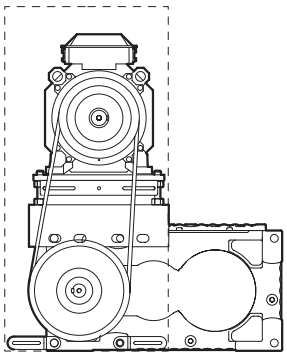
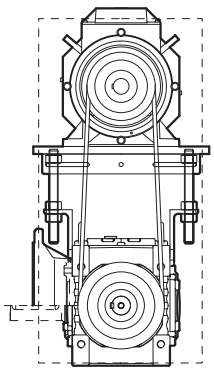
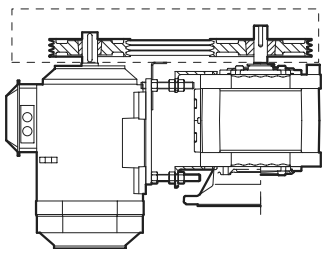
The V-belt drive is used when the overall gear ratio needs to be adjusted. The standard scope of delivery includes the motor bracket, belt pulleys, V-belt, and belt guard.

Only use belts with sufficient electrical shunt resistance (< 10^9 Ω).

- **Only when the protective cover was not supplied by SEW-EURODRIVE: Before a protective cover can be installed, a risk analysis must prove that no sources of ignition (e.g. impact sparks from grinding) can occur. This risk analysis must be made by the manufacturer.**

Note the permitted motor weight listed in the following table:

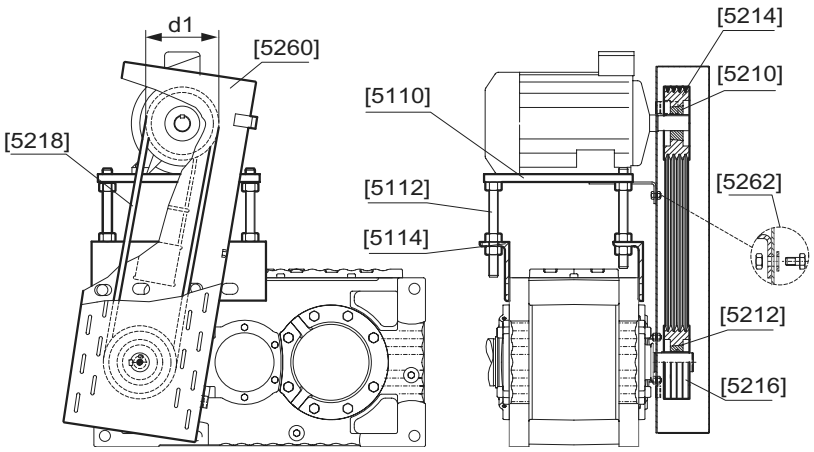
G_M = Motor weight G_G = Gear unit weight

	MC2P/MC3P	MC2R/MC3R
Upright mounting: **Foot mounted design $G_M \leq 0{,}4 \times G_G$** **Shaft mounted design $G_M \leq 0{,}4 \times G_G$** **Flange mounted design $G_M \leq 0{,}4 \times G_G$**	Contact SEW-EURODRIVE	Contact SEW-EURODRIVE
Horizontal output shaft: **Foot mounted design $G_M \leq 1{,}0 \times G_G$** **Shaft mounted design $G_M \leq 1{,}0 \times G_G$** **Flange mounted design $G_M \leq G_G$**	 54046AXX	 54047AXX
Vertical output shaft: **Foot mounted design $G_M \leq 0{,}4 \times G_G$** **Shaft mounted design $G_M \leq 0{,}4 \times G_G$** **Flange mounted design $G_M \leq 0{,}4 \times G_G$**	 54052AXX	Contact SEW-EURODRIVE

Heavier motor weights are only permitted if they have been specified in the purchase order.

G_M = Motor weight

G_G = Gear unit weight



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[5110, 5112] Motor bracket
[5114] Mounting bracket
[5210, 5212] Taper bushing
[5214, 5216] Belt pulleys
[5218] V-belt
[5260] Belt guard cover

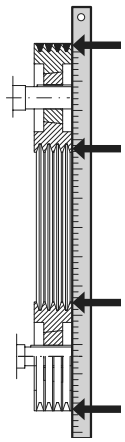
Assembly

The following installation instructions are only valid when you use taper bushings and belts supplied by SEW-EURODRIVE.

If you use parts from other manufacturers, observe the corresponding information.

- Mount the motor on the motor bracket (retaining screws not included in the scope of delivery).
- Attach the back plate of the belt guard cover [5260] to the motor bracket [5112, 5114] of the gear unit using screws. Observe the required direction of the opening of the belt guard cover [5260]. To adjust the tension of the V-belt, loosen the upper screw [5262] of the backplate of the belt guard cover.
- **Installing the taper bushings [5210, 5212]:**
  - Mount the belt pulleys [5214, 5216] onto the motor and gear shaft as close to the shaft shoulder as possible.
  - Degrease the taper bushings [5210, 5212] and belt pulleys [5214, 5216]. Insert the taper bushings [5210, 5212] into the belt pulleys [5214, 5216]. Make sure that the bores are aligned accurately.
  - Grease the retaining screws and screw them into the threading of the belt pulley hub.

– Clean motor and gear shaft and attach the completed belt pulleys [5214, 5216].
– Tighten the screws. Tap the sleeve lightly and retighten the screws. Repeat this procedure several times.
– Make sure that the belt pulleys [5214, 5216] are aligned accurately. Check the alignment using a steel ruler that has contact at four points (→ following figure).



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– Fill the clamping holes with grease to prevent the penetration of dirt.

- Pull the V-belts [5218] over the pulleys [5214, 5216] and tighten them using the adjustment screws in the motor bracket (→ "V-Belt Tightening" section).
- The maximum permissible error is 1 mm per 1,000 mm span of the V-belt. This way, maximum power transmission is ensured and excessive load on the gear and motor shafts can be prevented.
- **Check the belt tension using a V-belt tension meter:**
  – Measure the length of the V-belt span (= free V-belt length)
  – Measure the perpendicular force that causes a 16 mm sag per 1,000 mm of belt. Compare the measured values with those listed in the "V-Belt Tightening" section.
- Tighten the lock screws for the motor rack and the belt guard rear plate.
- Mount the belt guard cover using the hinge pins. Secure the hinge pins.

V-belt test forces

V-Belt Profile	∅ d_1 [mm]	Force required for offsetting the V-belt by 16 mm per 1,000 mm span length [N]
SPZ	56 - 95 100 - 140	13 - 20 20 - 25
SPA	80 - 132 140 - 200	25 - 35 35 - 45
SPB	112 - 224 236 - 315	45 - 65 65 - 85
SPC	224 - 355 375 - 560	85 - 115 115 - 150

5.8 Oil heater

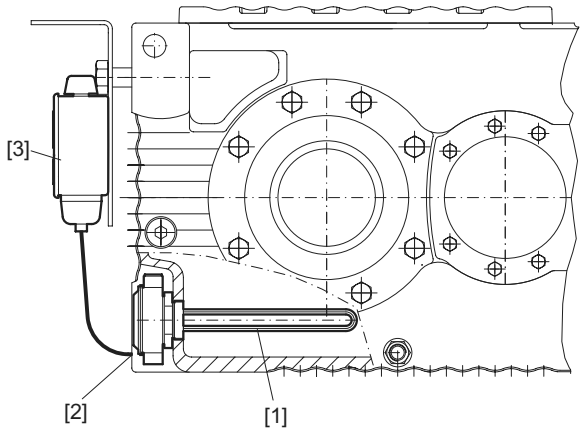
Using an oil heater is only permitted after consultation with SEW-EURODRIVE. Observe the special operating instructions.

An oil heater is required to ensure lubrication at startup when the ambient temperature is low (e.g. cold start of the gear unit).

Purpose and basic design

The oil heater consists of three components.

1. Resistor in the oil bath ("oil heater") with terminal box
2. Temperature sensor
3. Thermostat



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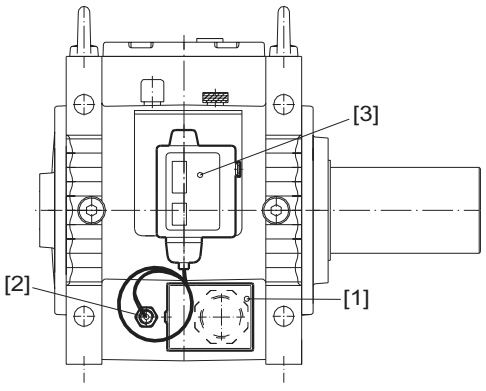
[1] Oil heater
[2] Temperature sensor
[3] Thermostat



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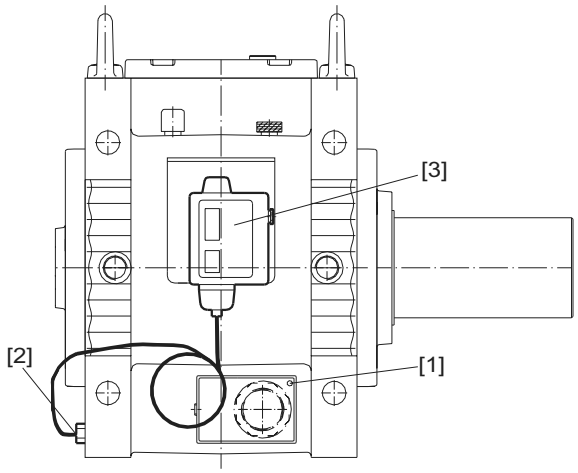
[1] Oil heater
[2] Temperature sensor
[3] Thermostat



[1] Oil heater

[2] Temperature sensor

[3] Thermostat

5.9 NTB temperature switch

Types: Electrotec NTB, 70 °C / Electrotec NTB, 80 °C / Electrotec NTB, 90 °C / Electroctec NTB, 100 °C

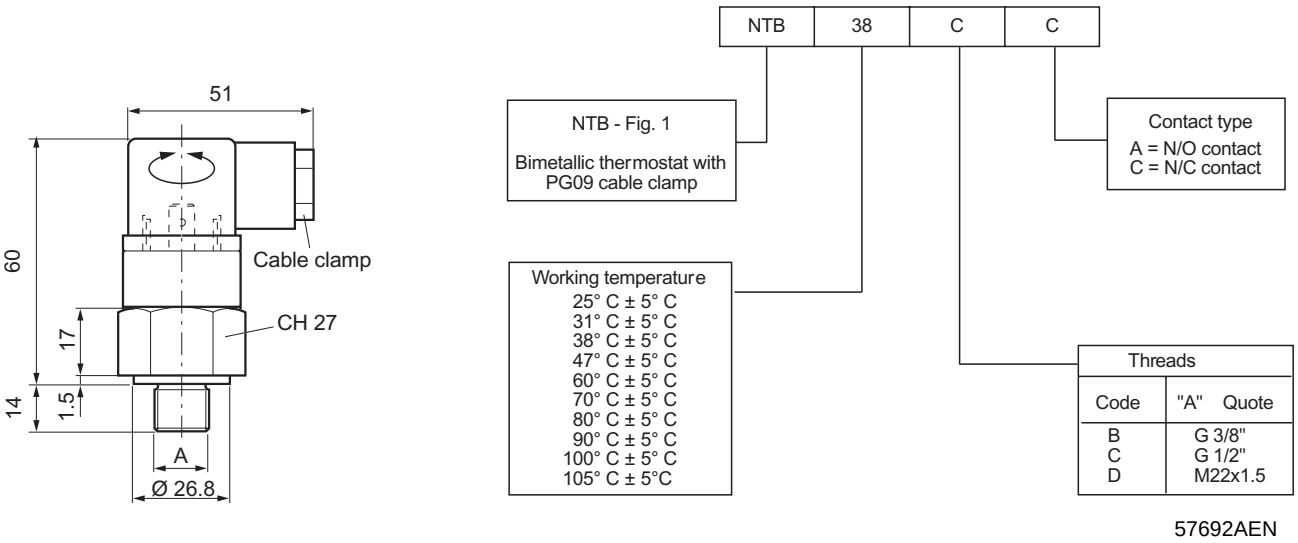
The NTB temperature switch is used for monitoring the oil that flows into the gear unit or the oil pan temperature.

The generally used functions of the temperature switch are:

- Pre-alarm at 70 °C or 80 °C
- Stopping the main motor of the gear unit at 90 °C or 100 °C

The NTB temperature switch consists of a brass housing with G1/2" external thread, a thermostat with an NC contact, and an insulator with a connection through the temperature switch.

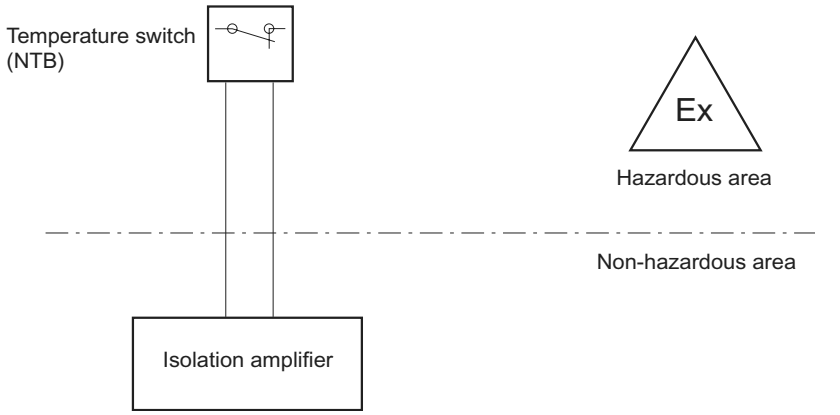
To guarantee a long service life and functioning under all conditions, using a relay in the circuit instead of a direct connection through the temperature switch is recommended.



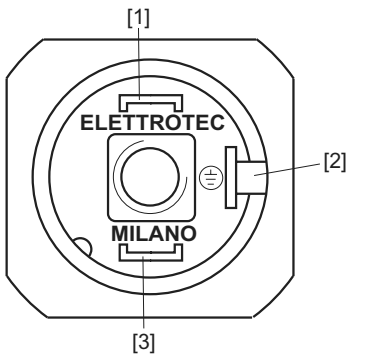
Technical data

Max. temperature	120 °C
Trigger temperature	70, 80, 90, 100 °C ± 5 °C
Number of operating cycles	100 000
Contact capacity	10 A - 240 V_{AC}
Gold contacts	
Difference △T	11 °C
Enclosure	IP65 / DIN 40050
PG09 plug connector	DIN 43650
Contact	NC contact
Material: Housing CH 27	Anodized aluminum
Material: Thermostat housing	

The temperature switch must be used with an isolating amplifier that enables intrinsically safe switching operations. The isolating amplifier must be located outside the potentially explosive atmosphere.



Wiring diagram



[1] NC contact (without vacuum)
[2] Grounding terminal 6.3 x 0.8
[3] NO contact (without vacuum)

5.10 SPM Adapter

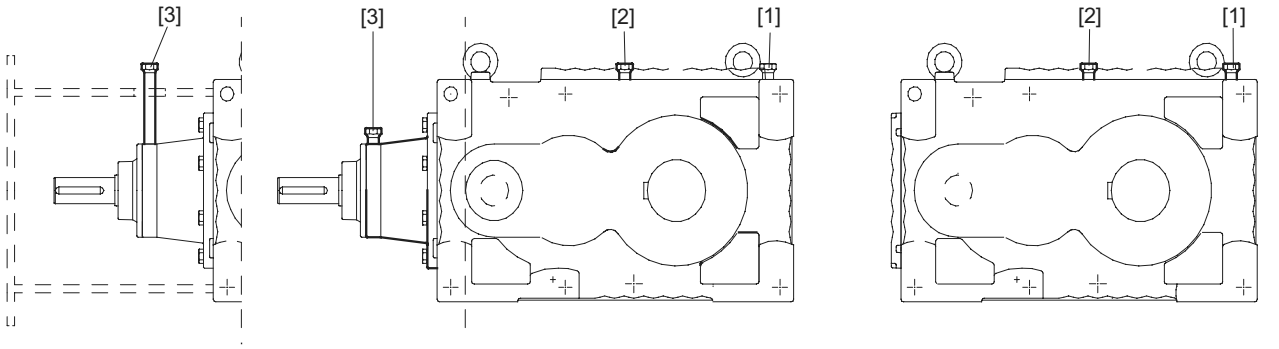
SPM adapters are available for measuring the impact load on the gear unit bearings. The impact load is measured using impact pulse sensors attached to the SPM adapter.

Mounting position

MC.R..: An extended SPM adapter [3] is required if a motor flange or fan is used.

MC.R..: SPM adapters [1] and [2] are attached to the side of the gear unit; SPM adapter [3] is attached to the pinion housing.

MC.P..: SPM adapters [1] and [2] are attached to the side of the gear unit.



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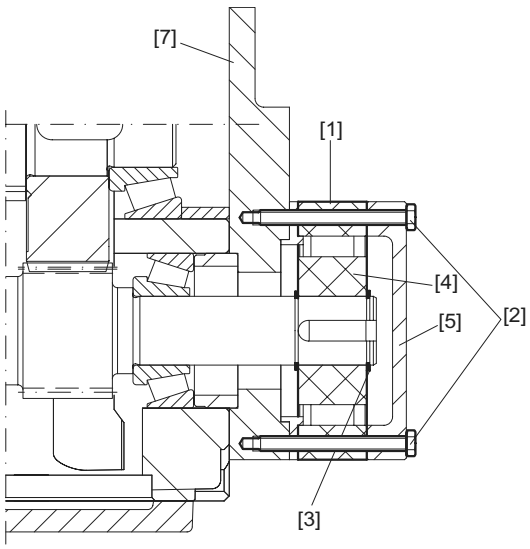

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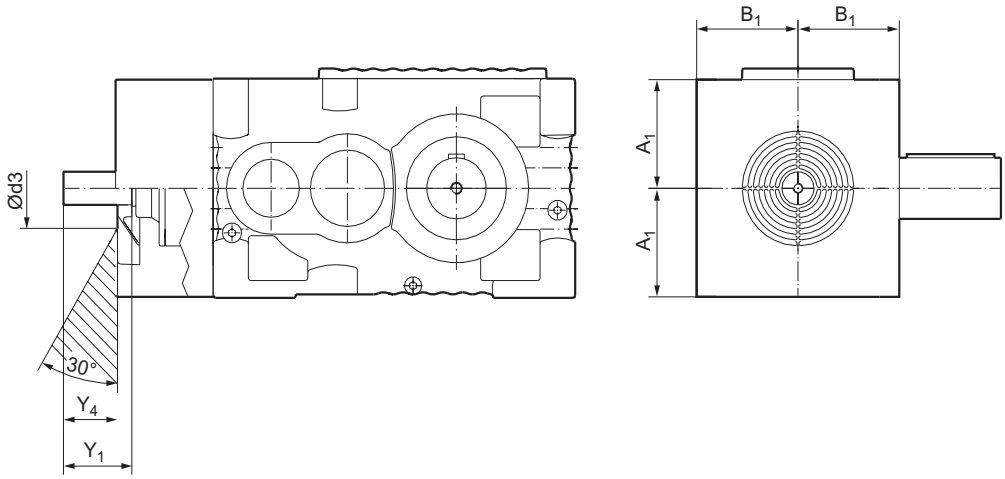
Only use units that are certified for use in potentially explosive areas.

Mounting the shock pulse sensor

- Remove the protection cap from the SPM adapter [1]. Ensure that the SPM adapter [1] is tightened correctly and securely.
- Mount the shock pulse sensor [2] on the SPM adapter [1].

5.11 Fan

A fan can be mounted if the projected thermal rating of the gear unit is exceeded. A fan can be retrofitted if the ambient conditions change after the gear unit has been installed. The direction of rotation of the gear unit does not influence the operation of the fan.



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Make sure the air intake vents are not blocked or covered.

Make sure the air intake vents are not blocked or covered.

Gear unit type	A_1	B_1	Y_4	Y_1	Air Intake	
	[mm]				∅ d_3 [mm]	Angle
MC3RL..02	158	160	70	100	109	30°
MC3RL..03	178	165	82	112	131	
MC3RL..04	198	185	90	120	131	
MC3RL..05	213	195	95	125	156	
MC3RL..06	232	220	100	130	156	
MC3RL..07	262	230	105	135	156	
MC3RL..08	297	255	105	135	198	
MC3RL..09	332	265	110	140	226	

5.12 Flow monitor

Use

The flow monitor is an electrical switch. It is used to control that the pressure lubricating system (→ Shaft end pump; → Motor pump) is functioning correctly by monitoring the oil flow.

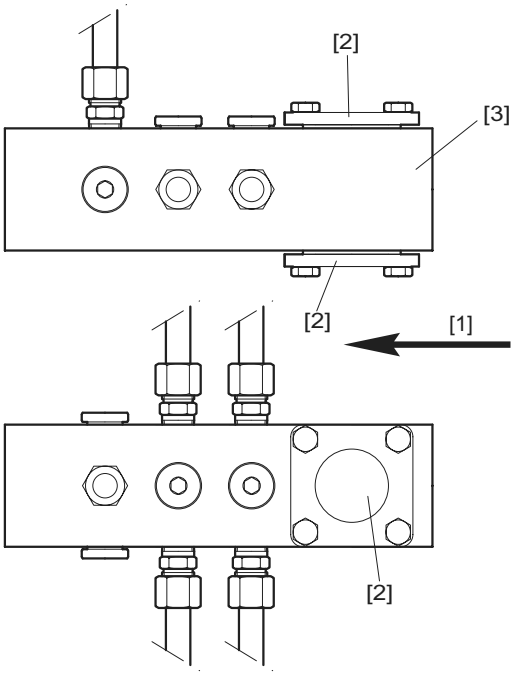
If, based on the project planning documents, a flow monitor is required, the gear unit may only be started up if a flow monitor has been installed.

Observe the corresponding operating instructions.

The flow monitor can only be used together with a monitoring system.

Check the effectiveness of the monitoring system prior to startup.

5.13 Optical oil flow indicator



[1] Oil flow direction
[2] Sight glass
[3] Oil distributor block

Use

The optical oil flow indicator is a simplified method of monitoring the function of a pressure lubrication system by facilitating a visual control of the oil flow. All gear units with oil pumps are equipped with an optical oil flow indicator as standard (as of 2006).

Gear units with an oil pump and a flow quantity of over 8.5 l/min are equipped with an electrical oil flow monitor and an optical oil flow indicator as standard.

Function

The oil flow is visible behind the sight glass [2]. If oil is not flowing and/or there are air bubbles in the oil, you must check how the pump and the suction line with its connections are functioning.

Clean sight glasses [2] and bright light behind the oil distributor block make it easier to detect the oil flow.

5.14 Connecting the oil/water cooling system

Follow the instructions in the separate manufacturer's documentation when connecting the oil/water cooling system.

5.15 Connecting the oil/air cooling system

Follow the instructions in the manufacturer's own documentation when connecting the oil/air cooling system.

5.16 Connecting the motor pump

Follow the instructions in the manufacturer's own documentation when connecting the motor pump.

6 Startup

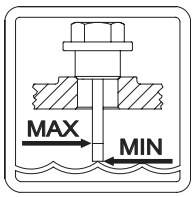
6.1 Notes on startup

- **You must observe the safety notes in the previous sections.**
- **Check the surface temperature before you perform maintenance on the gear unit or refill the gear unit oil. Risk of burns (hot oil in the gear unit)**
- **It is essential that there is no open fire or risk of sparks when working on the gear unit.**
- **Before startup, check that the oil level is correct. For lubricant fill quantities, refer to the nameplate.**
- **For gear units with long-term protection: Replace the screw plug at the location indicated on the gear unit with a breather plug (position → "Order Documents" section). Refer to the next page for information on long-term protection.**
- **After the gear unit has been installed, make sure that all retaining screws are on tightly.**
- **After tightening the mounting elements, check to make sure that the alignment did not change.**
- **If there are any oil draining taps, make sure that they cannot be opened by mistake.**
- **If you use an oil sight glass to monitor the oil level, it must be protected from possible damage.**
- **Protect the gear unit from falling objects.**
- **Check that the rotating parts on the protective equipment are fitted correctly. Contact with rotating parts is not permitted.**
- **Make sure that rotating shafts as well as couplings are equipped with suitable protective covers. Contact with rotating parts is not permitted.**
- **Take preventive measures to protect personnel from the solvent vapors generated by the vapor phase inhibitor (→ see section 2.5 "Long-Term Storage").**

6.2 Gear unit startup

Before startup

- **For gear units with long-term protection:** Remove the gear unit from the seaworthy protective crate.
- Remove the corrosion protection agent from the gear unit parts. Make sure gaskets, sealing surfaces and sealing lips are not damaged by mechanical abrasion, etc.
- Before filling the gear unit with the correct oil grade and volume, drain the remaining amount of protection oil. To do so, unscrew the oil drain plug and drain the remaining protection oil. Afterward, screw in the oil drain plug again.



- Remove the oil filling plug (position → "Mounting Positions" section). Use a funnel to fill the oil (filter mesh max. 25 µm). Fill the gear unit with the correct oil grade and quantity (→ section 3.3 "Nameplate"). The oil quantity specified on the nameplate of the gear unit is a reference value. **The mark on the dipstick is the best indicator of the correct oil level.** Use the oil dipstick to check that the oil level is correct (= below the "max" mark on the dipstick). After having filled the oil, replace the oil filling plug.
- For industrial gear units with steel oil expansion tanks (→ section 6.5 "Startup of MC industrial gear units with steel oil expansion tanks")

- **For gear units with oil sight glass** (optional): Control whether the oil level is correct with a visual inspection (= oil can be seen through oil sight glass).
- Make sure that rotating shafts as well as couplings are equipped with suitable protective covers.
- If the gear unit has a motor pump, check for proper functioning of the pressure lubricating system. Make sure that monitoring devices are connected properly.
- After the gear unit has been stored for a longer period of time (max. approx. 2 years), have it operate without load with the correct oil filling (→ section 3.3 "Nameplate"). This ensures that the lubricating system and particularly the oil pump are functioning correctly.
- If the gear unit is equipped with a fan on the input shaft, check for free air intake within the specified angle (→ section 5.11 "Fan").

Installation and startup of the monitoring equipment

If the project planning documents require the use of an oil temperature monitor, the gear unit may only be started up with an installed oil temperature monitor.

If a shaft end pump is available, the gear unit must also be equipped with additional flow monitoring. Depending on its use, the gear unit must be equipped with a temperature switch (flow control).

Check the effectiveness of the monitoring system prior to startup.

6.3 Run-in period

SEW-EURODRIVE recommends running the gear unit in as the first phase of startup. Increase load and revolutions in two to three steps up to the maximum level. The running-in phase takes approx. 10 hours.

Check the following points during the running-in phase:

- Verify the power values specified on the nameplate because their frequency may be a decisive factor for the service life of the gear unit.
- Does the gear unit run smoothly?
- Are there vibrations or unusual running noises?
- Are there signs of leakage (lubrication) on the gear unit?

For further information and troubleshooting measures, refer to the "Malfunctions" section.

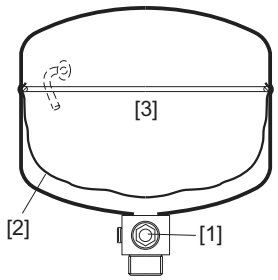
6.4 Starting up gear units with backstop

Make sure that the direction of rotation of the motor is correct for gear units with backstop

6.5 Startup of industrial gear units with steel oil expansion tanks

This section describes the procedure for filling MC.PV, MC.RV, and MC.RE gear units supplied with steel oil expansion tanks. Fill with oil very carefully. No more air may be in the gear unit. Before filling oil into the gear unit, the membrane in the steel oil expansion tank must be in the down position. The membrane moves up and down with the thermal expansion of the oil when the gear unit is in operation.

Position of the membrane before startup:



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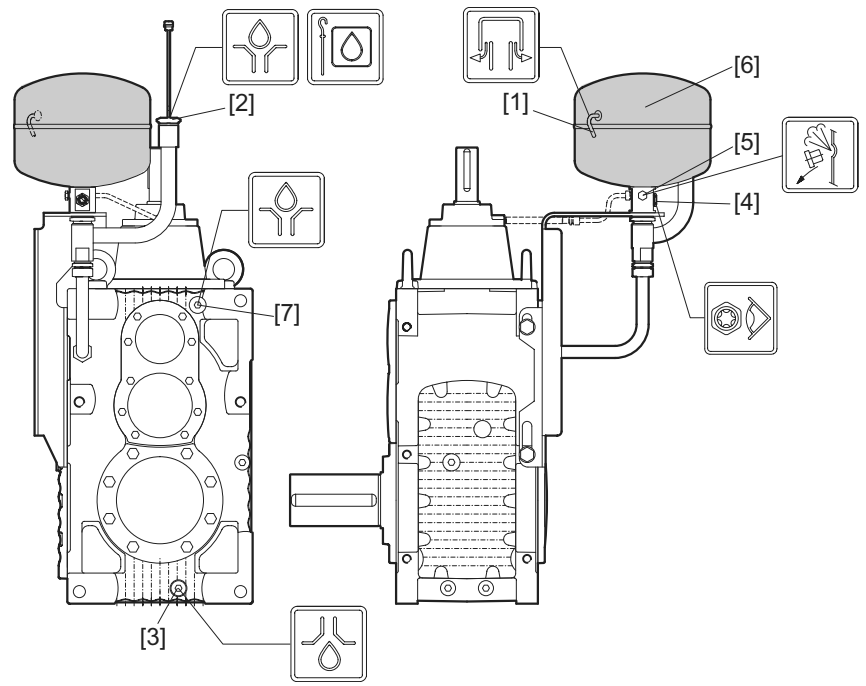
[1] Oil level

[2] Membrane in down position

[3] Air

If air penetrates below the membrane in the oil expansion tank, it can push the membrane upward. This causes pressure to build up in the gear unit, and leakage may result.

When being filled, the oil temperature must be the same as the ambient temperature, and the gear unit must be mounted in its final mounting position. If the gear unit is filled before it is mounted, it may not be tilted when being installed since the oil would then move the membrane upward.



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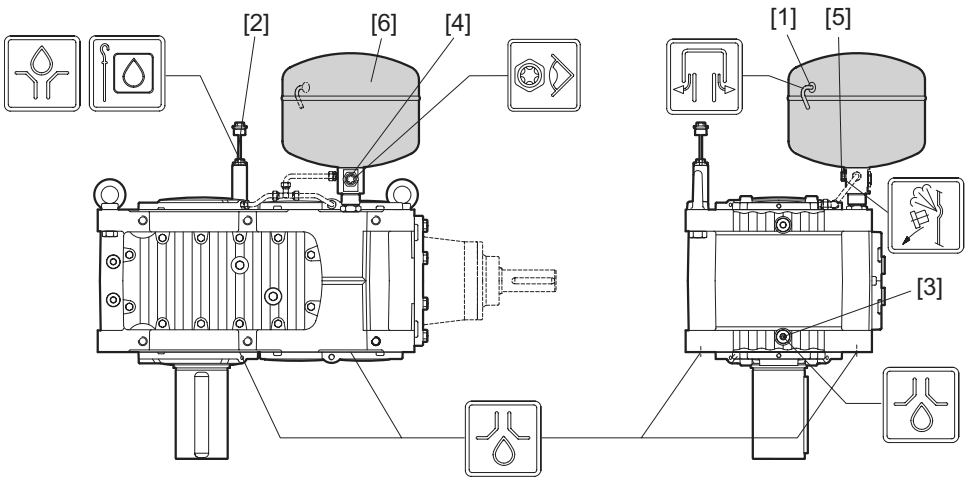
[1] Breather plug
[2] Dipstick and oil filling hole no. 2
[3] Oil draining screw
[4] Oil sight glass
[5] Air outlet screw
[6] Steel oil expansion tank
[7] Oil filling hole no. 1



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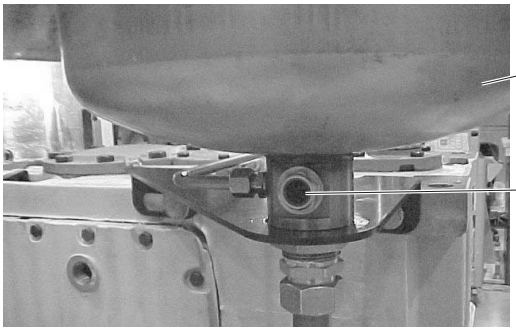
[1] Breather plug
[2] Oil dipstick
[3] Oil draining screw
[4] Oil sight glass
[5] Air outlet screw
[6] Steel oil expansion tank



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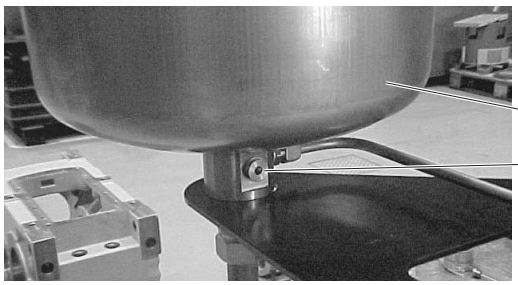

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1. Open the air outlet screw [5].
2. Open ALL of the screw plugs on the top of the gear unit (normally two to three screw plugs, such as the breather plug, oil filling plug, and dipstick).
3. Let compressed air into the oil expansion tank using the breather plug [1]. The membrane goes down (sometimes you will hear a popping noise).
4. Fill the oil through the oil filling holes ([2][7] refer to the previous page).
5. When the oil has reached the holes of the screw plugs (unless you are using a dipstick), screw the screw plugs back on to the housing. Start with the screw plug hole where the oil first begins to leak. Then close the second screw plug, and so forth. You can prevent air from entering the gear unit by using this procedure.
6. Fill the gear unit with oil until oil comes out of the air outlet screw [5]. Close the air outlet screw.
7. Fill the oil up to the oil sight glass [4].
8. Monitor the oil level using the oil sight glass and the dipstick. The correct oil level has been reached when half of the oil sight glass is covered with oil. The oil level in the oil sight glass is decisive.
9. Secure the dipstick on again [2].
10. Execute a trial run to ensure that the oil level does not sink below the oil sight glass.
11. Check the oil level only after the gear unit has cooled down to the ambient temperature.

Before the gear unit is filled with oil, the membrane in the oil expansion tank must be in the down position to prevent pressure from building up in the gear unit. Strict adherence to the described procedure is the prerequisite for any liability claim.

6.6 Measuring the surface and oil temperatures

The nameplate data on maximum surface temperature is based on measurements made under standard environmental and startup conditions. Even slight changes in these conditions (such as limited installation space) can have a significant impact on the temperature profile.

Measuring the surface temperature

It is essential to measure the surface temperature at maximum load during startup of the gear unit. You can use any commercially available thermometer for measuring. Measure the surface temperature at all accessible bearing positions. The maximum surface temperature is reached after approx. 6 hours and **may not be more than 70 K above the ambient temperature**.

Stop the drive immediately if the difference in temperature is above this value. Contact SEW-EURODRIVE in such cases.

Measuring the oil temperature

It is necessary to measure the oil temperature to determine the lubricant change intervals. Refer to the "Inspection and Maintenance" section for a description. To do this, measure the temperature at the bottom of the gear unit. You will have to measure the temperature at the oil drain plug if the gear unit has one. Add 10 K to the measured value. Base the oil replacement intervals on this value.

6.7 Starting up industrial gear units in potentially explosive areas

Define measures to ensure that the values on the nameplate of the gear unit are not exceeded. Never overload the gear unit.

Check that the data specified on the nameplate of the gear unit and the motor corresponds to the actual conditions at the location where the drive is to be installed.

Gear unit with frequency inverter and motor

- **Make sure that the gear unit is certified for operation with a frequency inverter (nameplate).**
- **The parameters of the frequency inverter must be set to prevent an overload of the gear unit. You will find the technical data for the gear unit on the nameplate.**

6.8 Putting gear units out of operation

Disconnect the drive from its supply and prevent it from being switched back on by mistake.

If the gear unit is not operated for a longer period of time, you must activate it regularly at intervals of approx. 2 - 3 weeks.

If the gear unit is not operated for a period **longer than six (6)** months, additional corrosion protection is required:

- **Corrosion protection for the interior of gear units with splash or bath lubrication:**

  Fill the gear unit up to the breather plug with the oil grade specified on the nameplate.
- **Corrosion protection for the interior of gear units with oil pressure lubrication:**

  Contact SEW-EURODRIVE in this case.
- **Exterior corrosion protection:**

  Apply a wax-based protective coating to shaft ends and unpainted surfaces as corrosion protection. Grease the sealing lips of the oil seal to protect them from preservative agents.

Refer to the "Startup" section before putting the gear unit back into operation.

7 Inspection and maintenance

- **You must observe the safety notes in the previous sections.**
- **All maintenance work must be done carefully by thoroughly trained personnel.**
- **Put gear units and mounted components out of operation.**
- **Work on the gear unit only when the machine is not in use. Prevent the drive unit from being accidentally switched on by locking the keyswitch or removing the fuses from the power supply. Put a sign at the on-switch to warn that the gear unit is being worked on.**

7.1 Inspection and maintenance intervals

Time interval	Activity
• **Daily**	• Check housing temperature: – For synthetic oil: max. 100 °C • Check gear unit noise • Check gear unit for signs of leakage
• **After 500 - 800 operating hours**	• First oil change after initial startup
• **After 500 operating hours**	• Check oil level, refill oil (→ section 3.3 "Nameplate") if necessary
• **Every 3000 hours of operation, at least every six months:**	• Check the oil: If the gear unit is operated outdoors or in humid conditions, check the water content of the oil. The water content must not exceed 0.05 % (500 ppm). • Fill labyrinth seals with grease. Use approx. 30 g grease per grease nipple. • Clean breather plug
• **Every 4000 operating hours**	• For gear units with drywell: Lubricate the lower bearing of the LSS
• **Depending on the operating conditions, at the latest every 12 months**	• Check whether retaining screws are tightly secured • Check contamination and the condition of the oil/air cooling system • Check the condition of the oil/water cooling system • Clean oil filter, replace filter element if necessary
• **Depending on the operating conditions, at the latest every 3 years**	• Change synthetic oil (→ "Inspection and Maintenance of the Gear Unit" section)
• **Varying (depending on external factors)**	• Touch up or renew the surface/anticorrosion coating • Clean the gear unit housing surface and fan • Check the oil heater: • Are all connection cables and terminals tightened securely and free from corrosion? • Clean encrusted elements (such as the heating element) and replace, if necessary (→ "Inspection and Maintenance" section).

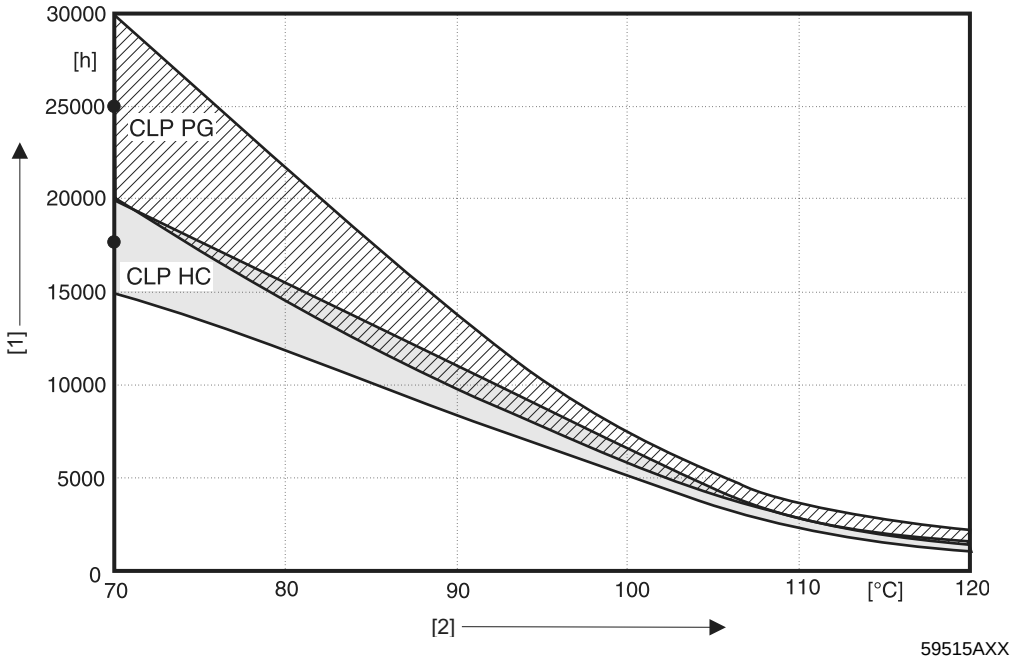
7.2 Inspection and maintenance work on couplings

Time Intervals	Activity
• Every 3000 machine hours, at least every 6 months	• Check torsional play • Visually check the elastic element
• After 25 000 - 30 000 machine hours	• Replace the elastic element

7.3 Lubricant change intervals

Change the oil more frequently when using special versions subject to more severe/aggressive environmental conditions!

PAO (polyalphaolefin) based synthetic lubricants are used for lubrication. The synthetic lubricant CLP HC (according to DIN 51502) shown in the following figure corresponds to the PAO oils.



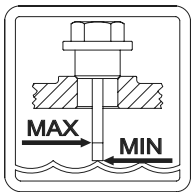
[1] Operating hours
[2] Sustained oil bath temperature
Average value by oil type at 70 °C

7.4 Checking the oil level

- **Do not intermix synthetic lubricants.**
- **Refer to the diagrams in the "Mounting Positions" section to determine the position of the oil level and oil drain plug, the breather valve, and the oil sight glass.**

1. **Disconnect the motor from its supply and prevent it from being switched back on by mistake.**

   Wait until the gear unit cools down – risk of burns!
2. For gear units with oil dipstick:
   - Unscrew the oil dipstick and remove it. Clean the dipstick and re-insert it into the gear unit (do **not** screw in tightly).
   - Remove dipstick again and check oil level. Correct if necessary: the oil level is correct when it is between the oil level mark (= maximum oil level) and the end of the dipstick (= minimum oil level)



3. For gear units with oil sight glass (optional): Visually check correct oil level (= middle of oil sight glass)

7.5 Checking the oil consistency

1. **Disconnect the motor from its supply and prevent it from being switched back on by mistake.**

   Wait until the gear unit cools down – risk of burns.
2. Remove a little oil from the oil drain plug.
3. Check the oil consistency:
   - You can receive more detailed information on testing the oil for water content and viscosity from the lubrication manufacturer.
   - Contact SEW-EURODRIVE if the oil is heavily contaminated.
4. For gear units with an oil level plug: Remove the oil level screw, check the fill level and correct it if necessary. Screw the oil level screw back in.

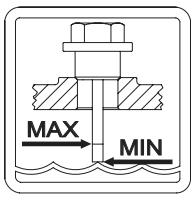
7.6 Changing the oil

- **When changing the oil, always refill the gear unit with the grade of oil that was used before. Mixing oils of different grade or manufacturer is not permitted. Especially synthetic oils may not be mixed with other synthetic oils. Flush the gear unit with the new oil grade thoroughly when switching from synthetic oil on a certain basis to synthetic oil with a different basis.**
- **Refer to the Lubrication table in section 9 to determine which oils from various lubricant manufacturers can be used.**
- **Information such as the lubricant fill quantity, viscosity and required quantity of oil is listed on the nameplate of the gear unit.**
- **The oil quantity specified on the nameplate is an approximate quantity. The mark on the oil sight glass or dipstick is the decisive indicator of the correct oil level.**
- **Only change the oil when the gear unit is at operating temperature.**
- **When changing the oil, flush the housing thoroughly with oil to remove oil sludge, oil residue, and abrasion. Use the same grade of oil that is used to operate the gear unit. Viscous oil must be heated up first. Fill with fresh oil only after all residues have been removed.**
- **The position of the oil level and oil drain plug and the breather valve depends on the mounting position. Refer to the diagrams of the mounting positions or the dimension drawing for the order.**

1. **Disconnect the motor from its supply and prevent it from being switched back on by mistake.**

   Wait until the gear unit cools down – risk of burns! If your gear unit is equipped with an oil expansion tank, let the gear unit cool to the ambient temperature. There might still be oil in the oil expansion tank that might leak through the oil filling hole.

   Note: The gear unit must still be warm, since the high viscosity of oil that is too cold makes it difficult to drain the oil correctly.
2. Place a container under the oil drain plug
3. Remove the oil filling plug, breather plug, and oil drain plugs. If the gear unit has a steel oil expansion tank, also remove the air outlet screw on the air expansion tank. To drain the oil completely, blow air through the breather into the oil expansion tank. As a result, the rubber membrane lowers and forces the remaining oil out. When the membrane lowers, the pressure is compensated and it becomes easier to fill the new oil.
4. Drain the oil completely.
5. Reinstall the oil drain plugs



6. Use a funnel to fill the oil (filter mesh max. 25 m). Fill new oil of the same type as the old oil via the oil filling plug (if you want to change the oil type, contact our customer service first).
   - Fill the oil according to the quantity specified on the nameplate (→ "Nameplate" section). The quantity of oil specified on the nameplate is an approximate value. **The marks on the oil dipstick determine the oil level.**
   - Check whether the oil level is correct using the oil dipstick
7. Screw the oil level plug back in. If your gear unit is equipped with a steel oil expansion tank, also screw in the air outlet screw.
8. Reinstall the breather plug.
9. Clean the oil filter, replacing the filter element if necessary (when using an external oil/air or oil/water cooling system).

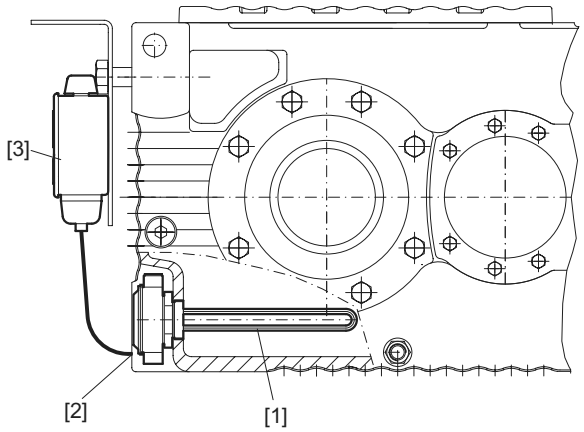
Any dripping oil must be removed immediately with an oil binding agent.

7.7 Cleaning the oil heater

Remove any encrusted oil from the oil heater. Remove the oil heater to clean it.

Deactivate the heating resistor before you drain the oil. The heating resistor can cause the evaporating oil to explode.

Removing the oil heater



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[1] Oil heater
[2] Temperature sensor
[3] Thermostat

- Remove the oil heater [1] and the gasket on the gear unit.
- Remove the base of the terminal box.
- Clean the tubular heating elements with solvent.

Be careful not to damage the heating elements by scratching or scraping.

Installing the oil heater

- Reinstall the oil heater [1] and the gasket on the gear unit. The tubular heating elements must always be immersed in liquid.
- Mount the base of the terminal box onto the heating rod using a mounting ring.
- Make sure that the gasket is fitted correctly between the terminal box and upper end of the heating element.
- Insert the temperature sensor [2] into the oil pan of the gear unit. Check the required activation temperature on the thermostat [3].

7.8 Vertical gear units with Drywell sealing system on the input shaft

The lower bearings of drywell version output shafts are lubricated with grease.

The sticker with the lubrication intervals on the gear unit contains information on the quantity of grease needed for the bearings. Use suitable grease for each greasing nipple as noted on the sticker (→ Lubricant table, section 10.2).

Use only for lubricating bearings.

If the gear unit has been stored for a longer time, you must change the bearing lubrication before starting up the gear unit.

The bearings must be lubricated regularly. Information on the quantity of grease and lubrication intervals can be found on the sticker on the gear unit.

SEW-EURODRIVE differentiates between two types of gear unit with drywell:

- Types E to G, with extended bearing distance (EBD)
- With standard bearing design

With EBD / E to G and drywell

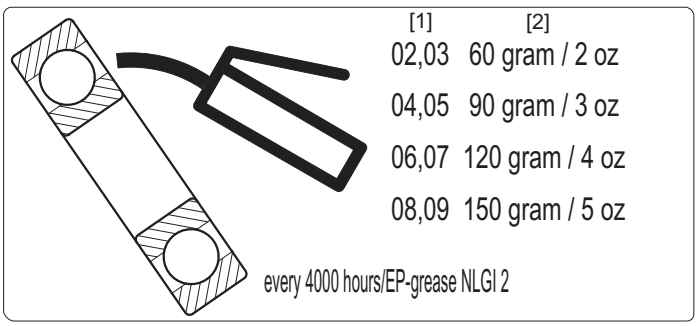

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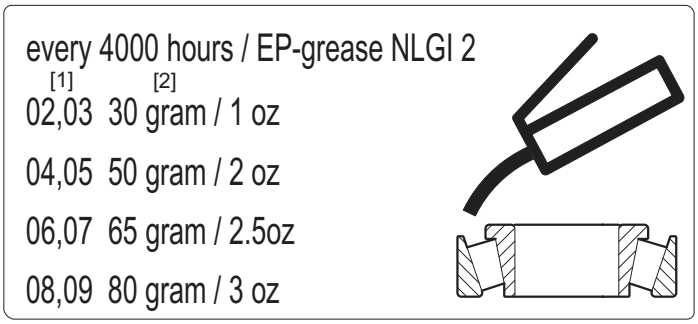
Figure 1: Lubrication quantity for EBD and drywell (see MC.V../E..G nameplate)

[1] Gear unit size (see nameplate)

[2] Lubrication quantity

Gear unit size MC.V.. / E...G	Grease Quantity [g]	Lubrication Interval
02	60	Every 4000 operating hours or at least every 10 months
03	60	
04	90	
05	90	
06	120	
07	120	
08	150	
09	150	

With standard bearing design and drywell



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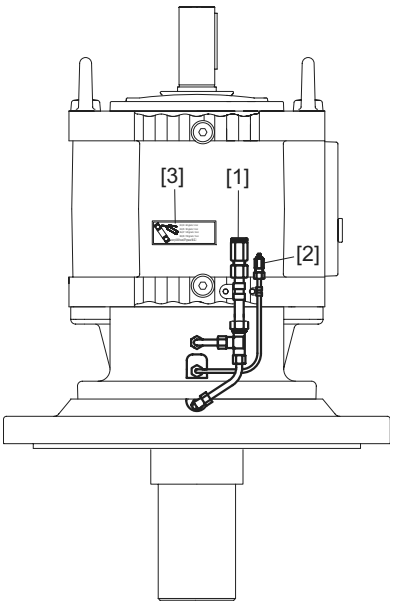
[1] Gear unit size (see nameplate)

[2] Lubrication quantity

Gear unit size MC.V..	Grease Quantity [g]	Lubrication Interval
02	30	After 4000 operating hours or at least every 10 months
03	30	
04	50	
05	50	
06	65	
07	65	
08	80	
09	80	

Proceed as follows to lubricate the bearings:



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[1] Grease draining pipe
[2] Greasing nipple
[3] Label with predefined lubrication quantity

- Fill the grease while the gear unit is in operation.
- Refer to the sticker [3] for the quantity of grease required.

Do not use high pressure to fill the grease.

High pressure presses out the grease between the sealing lip and the shaft. The sealing lip can be damaged or slip, grease can seep into the workflow, and the interior of the housing can corrode as a result of this.

Fill the grease while the gear unit is running by carefully pressing in the required quantity.

Do not exceed the grease quantity specified on the sticker.

1. Open the grease draining pipe [1]. The old grease oozes out.
2. Fill the grease using the greasing nipple [2].
3. Close the grease draining pipe [1].

8 Malfunctions

You must observe the safety notes in the previous sections.

Malfunctions that cause repairing the gear unit to become necessary may only be resolved by SEW-EURODRIVE during the warranty period.

After the warranty period has elapsed, we recommend that our customers take advantage of our customer service when malfunctions whose cause is not clear occur.

8.1 Gear unit malfunctions

Malfunctions	Possible cause	Remedy
Unusual, regular running noise	A Meshing/grinding noise: Bearing damage B Knocking noise: Irregularity in the gearing	A Check the oil (→ "Inspection and Maintenance" section), replace bearings B Contact customer service
Unusual, irregular running noise	Foreign bodies in the oil	• Check the oil (→ "Inspection and Maintenance" section) • Stop the drive, contact customer service
Unusual noises in the area of the gear unit mounting	Gear unit mounting has loosened	• Tighten retaining screws and nuts with the specified torque • Replace the damaged / defective retaining screws or nuts
Operating temperature too high	A Too much oil B Oil too old C The oil is heavily contaminated D Gear units with fan: air intake opening / gear unit housing contaminated E Shaft end pump defective F Malfunctions of oil/air or oil/water cooling system	A Check the oil level, correct if necessary (→ "Inspection and Maintenance" section) B Check when the oil was last changed; change the oil if necessary (→ "Inspection and Maintenance" section) C Change the oil (→ "Inspection and Maintenance" section) D Check the air intake opening and clean if necessary; clean gear unit housing E Check shaft end pump; replace if necessary F Note the separate operating instructions of the oil/water and oil/air cooling system.
Bearing point temperatures too high	A Insufficient oil B Oil too old C Shaft end pump defective D Bearing damaged	A Check the oil level, correct if necessary (→ "Inspection and Maintenance" section) B Check when the oil was last changed; change the oil if necessary (→ "Inspection and Maintenance" section) C Check shaft end pump; replace if necessary D Check bearing and replace if necessary, contact customer service
Oil leaking[1)] • Cover plate • Gear unit cover plate • Bearing cover • Mounting flange • Output/input end oil seal	A Gasket on assembly (MC2P) / gear unit / bearing cover / mounting flange leaks B Sealing lip of the oil seal rolled inside out C Oil seal damaged / worn down	A Tighten the bolts on the respective cover plate and observe the gear unit. If oil still leaks: Contact customer service B Vent the gear unit (see "Mounting Positions" section). Observe the gear unit. If oil still leaks: Contact customer service C Contact customer service
Oil leaking • from the oil drain plug • from the breather plug	A Too much oil B Drive operated in incorrect mounting position C Frequent cold starts (oil foams) and/or high oil level	A Correct the oil quantity (see → "Inspection and Maintenance" section) B Mount the breather plug correctly (see →"Mounting Positions" section) and correct the oil level (see → nameplate, "Lubricants" section)
Malfunctions of oil / air or oil / water cooling system		Note the separate operating instructions of the oil / water and oil / air cooling system.
Operating temperature at backstop too high	Damaged / defective backstop	• Check backstop; replace if necessary • Contact customer service

1) It is normal for small amounts of oil/grease to leak from the oil seal during the run-in phase - (24 hour run time, see also DIN 3761).

Customer service

Please have the following information on hand when you call our customer service:
- Complete nameplate data
- Type and extent of the problem
- Time the problem occurred and any accompanying circumstances
- Assumed cause

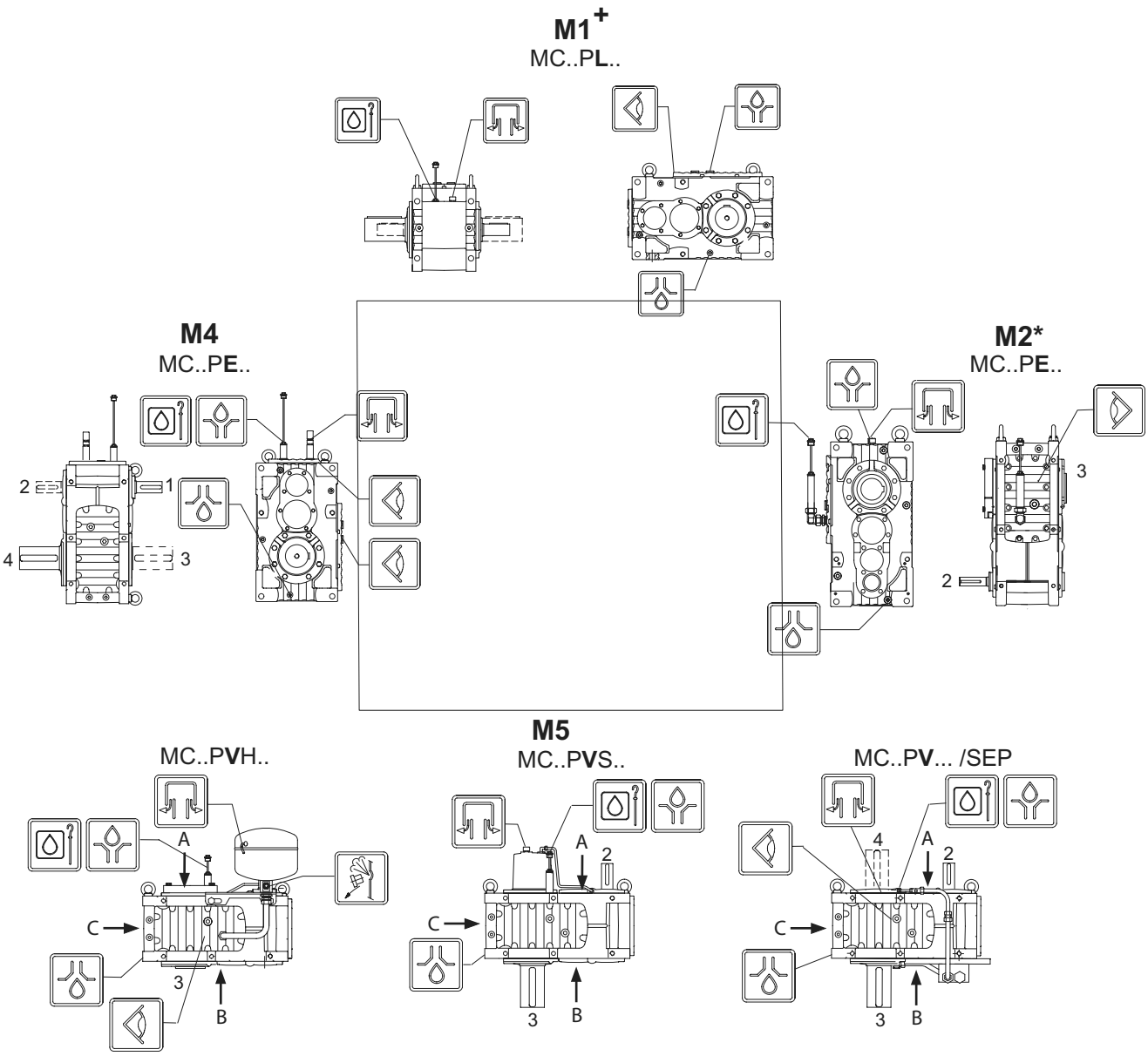
9 Mounting Positions

9.1 Symbols used

The following table shows the symbols used in the following figures and what they mean:

Symbol	Meaning
	Breather plug
	Air outlet screw
	Inspection opening
	Oil filling screw
	Oil draining screw
	Oil dipstick
	Oil sight glass

9.2 Mounting positions of MC.P.. gear units



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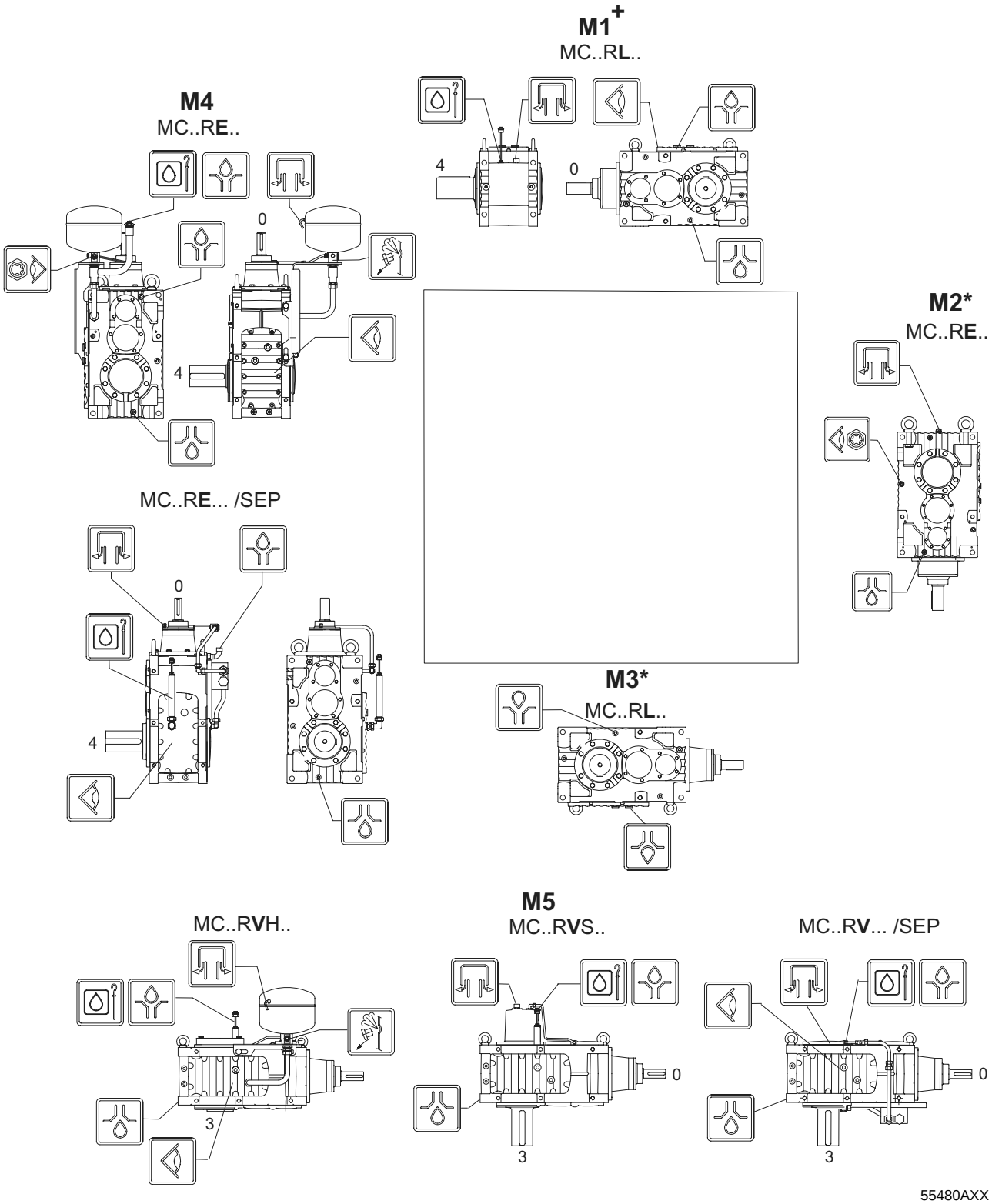
* = Non-standard mounting position / housing orientation. The positions of the heater, dipstick and oil drain plug are only examples. Refer to the dimension drawing for the order.

\+ = In the horizontal mounting position, the oil drain plug is always located on the side opposite the output shaft.

9.3 Mounting position of MC.R.. series industrial gear units



* = Non-standard mounting position / housing orientation. The positions of the heater, dipstick and oil drain plug are only examples. Refer to the dimension drawing for the order.

\+ = In the horizontal mounting position, the oil drain plug is always located on the side opposite the output shaft.

10 Design and Operating Notes

10.1 Guidelines for oil selection

General information

Unless a special arrangement is made, SEW-EURODRIVE supplies drives without oil fill.

That means that the gear unit must be filled with the correct oil grade and quantity before startup. The corresponding information can be found on the nameplate of the gear unit.

Contact SEW-EURODRIVE before changing the mounting position. Otherwise, the ATEX certification is not valid.

The oil grade and quantity required depends on the following factors:

- Gear unit size and type
- Gear unit design (MC..L.., MC...V.., MC...E) and housing orientation (M1...M6)
- Oil operating temperature depends on
  - Transmitted power
  - Ambient temperature
  - Type of lubrication (splash, bath, or pressure)
  - Additional cooling methods
- Minimum temperature for cold start

The oil must have the required viscosity and fulfill the following criteria:

- Higher viscosity index
- Must contain additives: oil anti-wear, rust protection, anti-oxidization, and anti-foam
- Must also contain an EP additive

If you have selected synthetic oil because of the operating temperature or oil change interval, SEW-EURODRIVE recommends oil based on polyalphaolefin (PAO).

Synthetic oil

Standard

Lubrication oils are divided into ISO VG viscosity classes according to SO 3448 and DIN 51519.

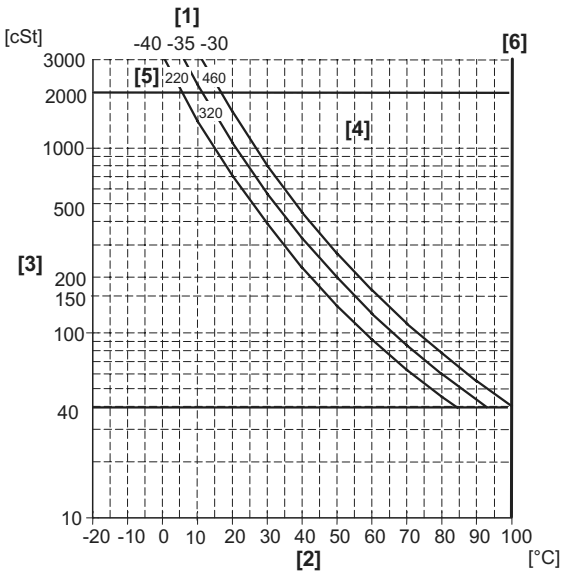
ISO-L-CKT 460	ISO 6743-6 Designation
220	ISO-L-CKT 220
320	ISO-L-CKT 320
460	ISO-L-CKT 460

Selection of viscosity class when using synthetic oil

Type of Lubrication	Ambient temperature	ISO VG synthetic
• **Oil bath lubrication** • **Splash lubrication** • **Pressure lubrication with oil heater and cooler**	–35...+30 °C	220
• **Oil bath lubrication** • **Splash lubrication** • **Pressure lubrication with oil heater and cooler**	–30...+40 °C	320
• **Oil bath lubrication** • **Splash lubrication** • **Pressure lubrication with oil heater and without cooler**	–25...+50 °C	460
• **Pressure lubrication with cooler**	+5...+30 °C	220
• **Pressure lubrication with cooler**	+10...+40 °C	320
• **Pressure lubrication without cooler**	+15...+50 °C	460

For pressure lubrication with and without cooler, the status for cold starts must be checked. When using an oil pump (pressure lubrication), the starting viscosity must be below 2000 cSt (→ refer to figure on following page).

Use an oil heater (→ section 5.8) if required.



[1] Pour point [°C]
[2] Operating temperature of the oil in the gear unit [°C]
[3] Viscosity [cSt]
[4] Viscosity index VI = 140..0.180
[5] ISO VG
[6] Temperature limit 100 °C

Note the maximum operating temperature of the gear unit.

ISO VG viscosity class	Max. permitted operating temperature [°C]
220	80
320	90
460	100 (105 possible briefly)

If required, a cooling system must be used (fan, water/air cooling system) or the oil change interval must be reduced (see "Lubricant Change Intervals" in the operating manual).

Oil grade selection for synthetic oil

Select the oil grade with the required viscosity from the table in "Lubricants" section 10.2.

10.2 Lubricant table

General

The lubricant table on the following page shows the permitted lubricants for SEW-EURODRIVE gear units. Please refer to the following key for the lubricant table.

Key to the lubricant table

Abbreviations used, meaning of shading and notes:

CLP PAO = Synthetic polyalphaolefin

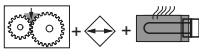
1) = Ambient temperature

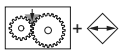
= Contact SEW-EURODRIVE

= Lubrication and cooling

= Splash lubrication

= Bath lubrication

 = Pressure lubrication with oil heater and cooler

 = Pressure lubrication with coller (without oil heater)

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			DIN (ISO)	ISO VG class	Mobil®	Shell	KLÜBER LUBRICATION	ARAL	bp	TEXACO	FUCHS	Q8	Castrol	TOTAL
MC..P	1) °C -40 0 +50		CLP PAO	VG 150			Klübersynth GEM4-150N	Degol PAS 150 Degol GS 150	Enersyn EP-XF 150 Enersyn SG-XP 150		Renolin Unisyn CLP 150	Q8 ELGRECO 150		Carter SH 150
	-35	+30	CLP PAO	VG 220	Mobilgear SHC XMP220	Omala Oil HD 220	Klübersynth GEM4-220N	Degol PAS 220 Degol GS220	Enersyn EP -XF 220 Enersyn SG-XP 220	Pinnacle EP 220	Renolin Unisyn CLP 220	Q8 ELGRECO 220	Optigear Synthetic X 220	Carter SH 220
	+5	+30												
MC..R	-30	+40	CLP PAO	VG 320	Mobilgear SHC XMP320 Mobil SHC 632	Omala Oil HD 320	Klübersynth GEM4-320N	Degol PAS 320 Degol GS 320	Enersyn EP-XF 320 Enersyn SG-XP 320	Pinnacle EP 320	Renolin Unisyn CLP 320	Q8 ELGRECO 320	Tribol 1510/ 320 Tribol 1710/ 320 Optigear Synthetic A320 Optigear Synthetic X 320	Carter SH 320
	+10	+40												
	-20	+50	CLP PAO	VG 460	Mobilgear SHC XMP460 Mobil SHC 634	Omala Oil HD 460	Klübersynth GEM4-460N	Degol PAS 460 Degol GS 460	Enersyn EP -XF 460 Enersyn SG -XP 460	Pinnacle EP 460	Renolin Unisyn CLP 460	Q8 ELGRECO 460	Tribol 1510/ 460 Tribol 1710/ 460 Optigear Synthetic A460 Optigear Synthetic X 460	Carter SH 460
	+15	+50												

10.3 Lubricant fill quantities

The specified fill quantities are guidelines. The precise values vary depending on the gear ratio.

MC.P.

Gear unit size	Type of lubrication	Oil quantity [l]					
		2-stage			3-stage		
		Mounting position					
		L	V	E	L	V	E
02	Splash bath	9 -	- 21	- 18	11 -	- 25	- 20
03	Splash bath	14 -	- 26	- 23	15 -	- 31	- 32
04	Splash bath	18 -	- 34	- 31	20 -	- 45	- 45
05	Splash bath	24 -	- 45	- 35	27 -	- 58	- 54
06	Splash bath	28 -	- 58	- 45	36 -	- 73	- 65
07	Splash bath	33 -	- 94	- 59	47 -	- 102	- 89
08	Splash bath	55 -	- 117	- 77	68 -	- 133	- 113
09	Splash bath	79 -	- 139	- 107	90 -	- 151	- 137

MC.R.

Gear unit size	Type of lubrication	Oil quantity [l]					
		2-stage			3-stage		
		Mounting position					
		L	V	E	L	V	E
02	Splash bath	10 -	- 19	- 18	10 -	- 19	- 19
03	Splash bath	14 -	- 27	- 29	13 -	- 27	- 28
04	Splash bath	19 -	- 34	- 34	18 -	- 34	- 35
05	Splash bath	22 -	- 47	- 47	24 -	- 47	- 47
06	Splash bath	26 -	- 59	- 60	28 -	- 59	- 61
07	Splash bath	32 -	- 89	- 91	33 -	- 88	- 89
08	Splash bath	58 -	- 111	- 119	56 -	- 111	- 116
09	Splash bath	84 -	- 137	- 133	79 -	- 137	- 137

For pressure lubrication, note the information on the nameplate and in the documentation for the order.

10.4 Sealing grease

SEW-EURODRIVE recommends the grease types listed in the table below for operating temperatures from –40 °C to +80 °C.

Properties of the grease:

- Contains EP additive
- NLGI grade 2

The sealing grease can be use as follows:

- As sealing grease
- As bearing grease for the lower bearings of the LSS for gear units with a drywell sealing system

Supplier	Grease
Fuchs	Renolit CX-Tom 15

11 Declaration of Conformity

EG-Konformitätserklärung

EC-Declaration of Conformity
Déclaration de conformité CE

TÜV CERT DIN EN ISO 9001

SEW EURODRIVE

im Sinne der Richtlinie 94/9/EG, Anhang VIII **Nr**./*No*/*N°* **146.02**
according to EC Directive 94/9/EC, Appendix VIII
au sens de la directive CE 94/9/CE, Annexe VIII

SEW EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

erklärt in alleiniger Verantwortung die Konformität der folgenden Produkte:
declares under sole responsibility conformity of the following products:
déclare, sous sa seule responsabilité, que les produits :

Getriebe	**MC 02-09 der Kategorien**	**2GD**
Gear Units	*MC 02–09 in categorys*	*2GD*
Réducteurs	*MC 02-09 des catégories*	*2GD*

mit der Richtlinie:	***94/9 EG***
with the directive:	*94/9 EC*
respectent la directive :	*94/9 CE*

angewandte Normen:	**EN 1127-1: 1997-10**
applied standards:	**EN 13463-1: 2001-11**
Normes appliquées :	**EN 13463-5: 2003-12**
	EN 13463-8: 2003-09
	EN 60529 :2000-09

SEW-EURODRIVE hinterlegt die gemäß 94/9EG, Anhang VIII geforderten Unterlagen bei benannter Stelle: FSA GmbH, EU - Kennnummer 0558

SEW-EURODRIVE will archive the documents required according to 94/9/EC, Appendix VIII at the following location: FSA GmbH, EU Code 0558

SEW-EURODRIVE tient à disposition la documentation spécifiée dans la directive 94/9/CEE, Annexe VIII pour consultation à l'endroit désigné : FSA GmbH, code UE 0558

Ort / Datum
Place/date / Lieu et date

Bruchsal, 14.06.2005

Geschäftsführer Vertrieb und Marketing
Managing Director Sales and Marketing
Directeur général international commercial et marketing

H. Sondermann

EG-Konformitätserklärung

EC Declaration of Conformity
Déclaration de conformité CE

DIN EN ISO 9001

im Sinne der Richtlinie 94/9/EG, Anhang VIII **Nr.**/*No*/*N°* **145.03**
according to EC Directive 94/9/EC, Appendix VIII
au sens de la directive CE 94/9/CE, Annexe VIII

SEW EURODRIVE GmbH & Co KG

Ernst-Blickle-Straße 42, D-76646 Bruchsal

erklärt in alleiniger Verantwortung die Konformität der folgenden Produkte:
declares under sole responsibility conformity of the following products:
déclare, sous sa seule responsabilité, que les produits :

Getriebe	**MC 02-09 der Kategorien**	**3GD**
Gear Units	*MC 02-09 in category*	*3GD*
Réducteurs	*MC 02-09 des catégories*	*3GD*

mit der Richtlinie:	***94/9 EG***
with the directive:	*94/9 EC*
respectent la directive :	*94/9 CE*

angewandte Normen:	**EN 1127-1: 1997-10**
applied standards:	**EN 13463-1: 2002-04**
Normes appliquées :	

SEW-EURODRIVE hält die gemäß 94/9/EG geforderten Unterlagen zur Einsicht bereit.

SEW-EURODRIVE will make available the documents required according to 94/9/EG for reference purposes.

SEW-EURODRIVE tient à disposition la documentation spécifiée dans la directive 94/9/CE pour consultation.

Ort/Datum
Place/date / Lieu et date

Bruchsal, 11.05.2005

Geschäftsführer Vertrieb und Marketing
Managing Director Sales and Marketing
Directeur général international commercial et marketing

H. Sondermann

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	Lyon	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Paris	SEW-USOCOME Zone industrielle 2, rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
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Algeria			
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Argentina			
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Bulgaria			
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Chile			
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China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25322611 gm-tianjin@sew-eurodrive.cn http://www.sew-eurodrive.com.cn
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Colombia			
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Czech Republic			
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Denmark			
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Lithuania			
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Morocco			
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Netherlands			
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New Zealand			
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Norway			
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Portugal			
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Romania			
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	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-97411 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk

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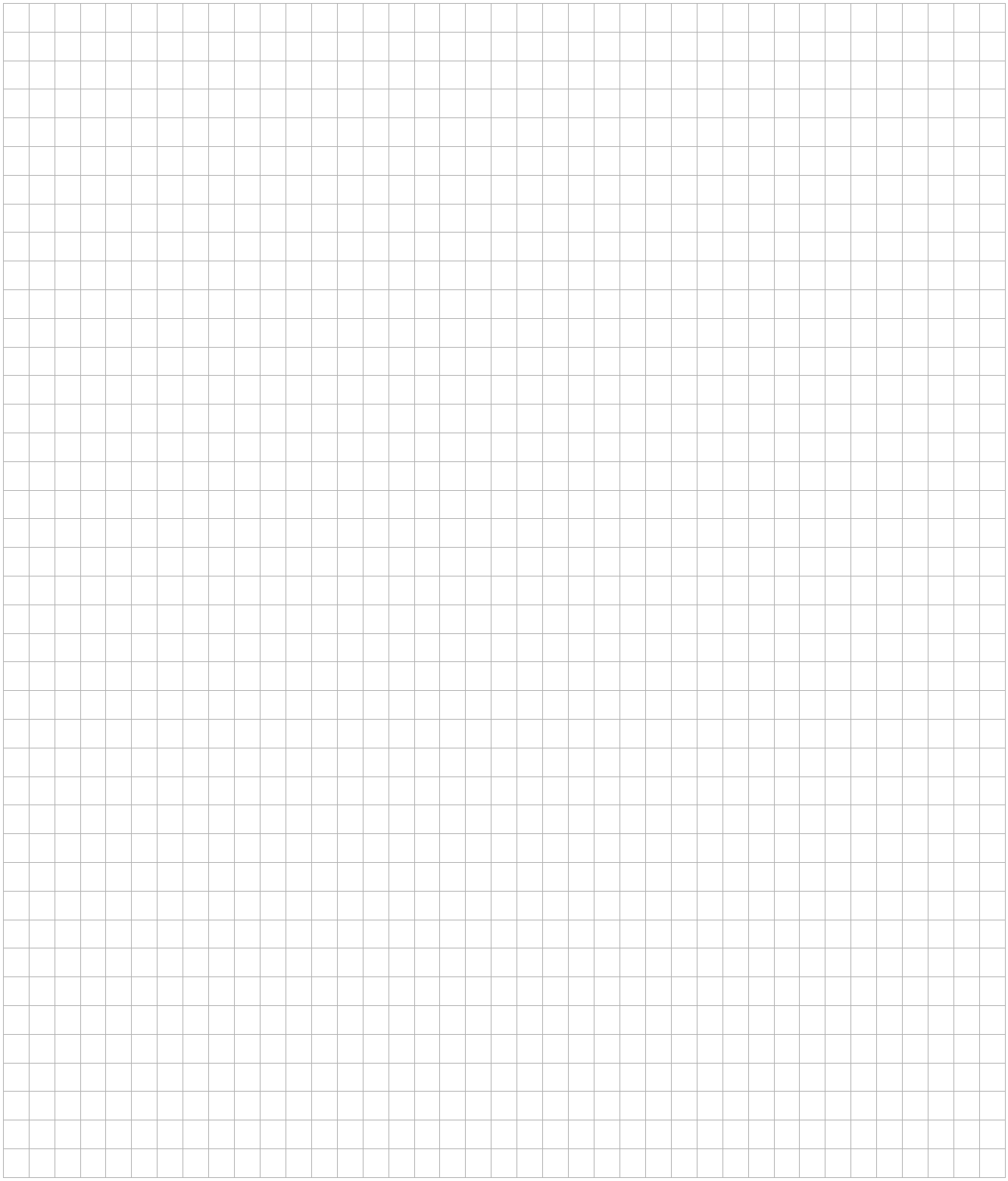
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO - 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za dross@sew.co.za

South Africa			
	Capetown	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 dswanepoel@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 dtait@sew.co.za
Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 9 4431 84-70 Fax +34 9 4431 84-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es
Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442-00 Fax +46 36 3442-80 http://www.sew-eurodrive.se info@sew-eurodrive.se
Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch
Thailand			
Assembly **Sales** **Service**	**Chon Buri**	SEW-EURODRIVE (Thailand) Ltd. Bangpakong Industrial Park 2 700/456, Moo.7, Tambol Donhuaroh Muang District Chon Buri 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com
Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service 7, rue Ibn EI Heithem Z.I. SMMT 2014 Mégrine Erriadh	Tel. +216 1 4340-64 + 1 4320-29 Fax +216 1 4329-76 tms@tms.com.tn
Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 / 164 3838014/15 Fax +90 216 3055867 sew@sew-eurodrive.com.tr
Ukraine			
Sales **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua
USA			
Production **Assembly** **Sales** **Service**	**Greenville**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manuf. +1 864 439-9948 Fax Ass. +1 864 439-0566 Telex 805 550 http://www.seweurodrive.com cslyman@seweurodrive.com

USA			
Assembly **Sales** **Service**	**San Francisco**	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. +1 510 487-3560 Fax +1 510 487-6381 cshayward@seweurodrive.com
	Philadelphia/PA	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Dayton	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 cstroy@seweurodrive.com
	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve sewventas@cantv.net sewfinanzas@cantv.net



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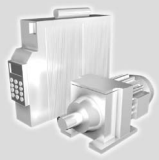

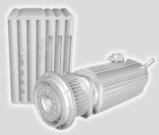

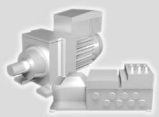

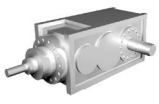

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